

Supplementary Information

Food Waste Valorization to Green Energy Vehicles: Sustainability Assessment

Jaewon Byun, Oseok Kwon, Hoyoung Park, and Jeehoon Han*

* Corresponding author: Tel.: +82 63 270 4039; fax: +82 63 270 2306. E-mail address: jhhan@jbnu.ac.kr

S.1 Forecast analysis

Table S1. The FW carbon footprint (FWCF) by country in 2030

Unit: million t of CO₂ / year

Country	FWCF	Country	FWCF	Country	FWCF
Albania	5	Japan	69	Tunisia	31
Armenia	5	Republic of Korea	300	Turkey	104
Austria	9	Angola	32	Turkmenistan	13
Azerbaijan	10	Benin	11	United Arab Emirates	23
Belarus	11	Botswana	1	Uzbekistan	44
Belgium	14	Burkina Faso	12	Yemen	10
Bosnia and Herzegovina	3	Cabo Verde	7	Afghanistan	13
Bulgaria	5	Cameroon	19	Bangladesh	65
Croatia	4	Central African Republic	3	Brunei Darussalam	1
Cyprus	1	Chad	6	Cambodia	89
Czechia	7	Congo	4	India	691
Denmark	9	Cote d'Ivoire	17	Indonesia	173
Estonia	1	Djibouti	1	Iran (Islamic Republic of)	95
Finland	6	Ethiopia	51	Lao People's Democratic Republic	8
France	77	Gabon	1	Malaysia	29
Georgia	3	Gambia	6	Maldives	2
Germany	80	Ghana	37	Myanmar	71
Greece	18	Guinea	7	Nepal	29
Hungary	9	Guinea-Bissau	4	Pakistan	140
Iceland	1	Kenya	34	Philippines	81
Ireland	6	Lesotho	1	Sri Lanka	16
Italy	73	Liberia	2	Thailand	66
Latvia	2	Madagascar	13	Timor-Leste	7
Lithuania	3	Malawi	25	Viet Nam	90
Luxembourg	0	Mali	15	Antigua and Barbuda	8
Malta	0	Mauritania	2	Argentina	161
Montenegro	1	Mauritius	2	Bahamas	0
Netherlands	26	Mozambique	18	Barbados	1

Norway	8	Namibia	3	Belize	2
Poland	37	Niger	25	Bermuda	1
Portugal	15	Nigeria	182	Bolivia (Plurinational State of)	84
Republic of Moldova	2	Rwanda	11	Brazil	423
Romania	24	Sao Tome and Principe	0	Chile	32
Russian Federation	107	Senegal	7	Colombia	40
Serbia	7	Sierra Leone	15	Costa Rica	9
Slovakia	3	South Africa	50	Cuba	10
Slovenia	2	Sudan (former)	40	Dominica	3
Spain	75	Swaziland	1	Dominican Republic	17
Sweden	9	Togo	9	Ecuador	14
Switzerland	6	Uganda	26	El Salvador	4
The former Yugoslav Republic of Macedonia	2	United Republic of Tanzania	32	Grenada	5
Ukraine	44	Zambia	8	Guatemala	11
United Kingdom	54	Zimbabwe	10	Guyana	2
Australia	31	Algeria	42	Haiti	4
Canada	52	Democratic People's Republic of Korea	28	Honduras	6
Fiji	0	Egypt	97	Jamaica	27
French Polynesia	0	Iraq	19	Mexico	132
Kiribati	0	Israel	13	Nicaragua	4
New Caledonia	0	Jordan	8	Panama	4
New Zealand	10	Kazakhstan	28	Paraguay	32
Samoa	0	Kuwait	6	/u	23
Solomon Islands	0	Kyrgyzstan	7	Saint Kitts and Nevis	0
United States of America	380	Lebanon	4	Saint Lucia	0
Vanuatu	0	Mongolia	7	Saint Vincent and the Grenadines	0
China, Hong Kong SAR	7	Morocco	40	Suriname	0
China, Macao SAR	79	Oman	7	Trinidad and Tobago	1
China, mainland	2,272	Saudi Arabia	37	Uruguay	8
China, Taiwan Province of	21	Tajikistan	9	Venezuela (Bolivarian Republic of)	103

Table S2. The light-duty vehicles carbon footprint (LCF) by country in 2030¹

Unit: million t of CO₂ / year

Country	LCF	Country	LCF	Country	LCF
Afghanistan	1	Finland	6	Mozambique	4
Albania	3	France	65	Myanmar	8
Algeria	43	Gabon	2	Namibia	2
Argentina	37	Gambia	0	Nepal	3
Armenia	2	Georgia	3	Netherlands	18
Australia	59	Germany	95	New Zealand	9
Austria	12	Ghana	11	Niger	3
Azerbaijan	6	Greece	13	Norway	14
Bangladesh	13	Grenada	0	Oman	11
Barbados	0	Guatemala	6	Paraguay	4
Belarus	10	Guinea	2	Peru	24
Belgium	12	Guyana	1	Philippines	39
Benin	4	Haiti	1	Poland	30
Bhutan	0	Honduras	3	Portugal	11
Bosnia and Herzegovina	3	Hungary	9	Republic of Korea	68
Botswana	3	Iceland	1	Republic of Macedonia	1
Brazil	136	India	407	Republic of Moldova	1
Bulgaria	7	Indonesia	134	Republic of Serbia	7
Burkina Faso	4	Ireland	8	Romania	11
Burundi	1	Israel	12	Russia	125
Cabo Verde	0	Italy	58	Senegal	3
Cambodia	5	Japan	105	Seychelles	0
Cameroon	3	Jordan	7	Singapore	5
Canada	129	Kazakhstan	12	Slovakia	5
Central African region	1	Kenya	10	Slovenia	3
Chad	4	Kiribati	0	South Africa	58
Chile	31	Kyrgyzstan	3	Spain	65
China	770	Laos	3	Sri Lanka	6
Colombia	24	Latvia	2	Sweden	11
Comoros	0	Lebanon	4	Switzerland	7
Congo	3	Lesotho	1	Tajikistan	1

Costa Rica	3	Liberia	1	Thailand	54
Côte d'Ivoire	3	Liechtenstein	0	Togo	2
Croatia	3	Lithuania	4	Trinidad and Tobago	3
Cyprus	2	Luxembourg	4	Tunisia	13
Czech republic	10	Madagascar	3	Turkey	66
D.R.Congo	3	Maldives	1	Uganda	8
Denmark	7	Malta	1	Ukraine	33
Djibouti	1	Marshall Islands	0	United Kingdom	73
Dominica	0	Mauritania	2	United Republic of Tanzania	9
Dominican Republic	6	Mauritius	1	Uruguay	3
Ecuador	16	Mexico	147	US	780
Equatorial Guinea	1	Monaco	0	Vanuatu	0
Eritrea	1	Mongolia	3	Vietnam	48
Estonia	2	Montenegro	1	Zambia	2
Ethiopia	13	Morocco	19	Zimbabwe	2

Table S3. Composition of FW by country

Types	Unit: wt%			
	Water	Protein	Lipid	Carbohydrate
China	65.1	7.3	3.2	24.4
India	56.9	7.4	3.7	32.0
USA	48.2	11.2	4.5	36.1
Brazil	43.9	13.5	4.4	38.2

Table S4. Food waste potential energy (FWPE) by country in 2030

	Unit: EJ			
	China	India	USA	Brazil
FWPE	7.80	3.20	1.61	1.64

S.2 System-level simulation

Anaerobic digestion (AD) for methane and hydrogen production

Two process simulation models for the production of methane and hydrogen from FW were developed using SuperPro Designer² (Fig. S1 and S2). Large-scale processes were designed based on the kinetic models for AD³⁻⁵ considering chemical inhibitors of each reaction, which assumed n^{th} plant processing of 50 t/d of FW. Heat exchangers for heat integration were also designed in the processes. Models were developed by countries (China, India, USA, and Brazil) to compare characteristics of each country. The FW compositions of four countries are shown in Table S3.

1) Methane production from FW

A large-scale methane production process from 50 t/d of FW was designed based on the results for AD reported in the previous studies^{3,4} (Fig. S1). The FW stream (50 t/d) was charged to an anaerobic digester maintained at 55 °C. Water was added to maintain a solid mass fraction (including carbohydrates, proteins, and lipids) of 0.93. After 15 d, 0.022–0.037 tons of biogas were produced / t of FW, which consists of 31.1–38.2 wt% of methane and 61.5–68.7 wt% of CO₂.

2) Hydrogen production from FW

A large-scale process producing hydrogen and methane from 50 t/d of FW was designed based on the results for AD reported in the previous studies³⁻⁵ (Fig. S2). The FW (50 t/d) was fed to a hydrolysis reactor at 55 °C, where 50% of the carbohydrate was converted to a soluble carbohydrate (glucose). Then, the soluble carbohydrate was fed to dark fermenter, where 1 mol of carbohydrate was decomposed to 2 mol of acetic acid, 2 mol of CO₂, and 4 mol of hydrogen. After the reaction, 60% of soluble carbohydrate was decomposed, and the product stream contained a low concentration (5.6–5.8 wt%) of acetic acid.

Pressure swing adsorption (PSA)

In this study, two PSA technologies are considered to separate biomethane and hydrogen from CO₂ (Fig. S1 and S5).

1) Separation of biomethane from CO₂.

Grande CA et al.⁶ reported the experimental procedure for lab-scale separation of methane from CO₂ by using PSA, and they evaluated the process performance with equilibrium and kinetic based adsorbents. Carbon molecular sieve 3K was employed as the example of a kinetic adsorbent because methane diffusion is extremely small. A five-step cycle configuration (feed, intermediate depressurization, blowdown, purge and pressurization) was employed to compare with results obtained with a four-step cycle without intermediate depressurization. Adsorption equilibrium and kinetic for methane and CO₂ in carbon molecular sieve 3K are obtained by simulation that changed many variables. (column length, cycle time, operating pressure, etc.). The purity and recovery rate according to the change of each step time are obtained based on the kinetic model. The purity of 98% or more of methane is a reasonable assumption that hydrogen sulfide has been removed, so a cycle based on this is determined. (pressurization time = 70 s, feed time = 130 s, depress time = 10 s, blow time = 140 s, feed pressure = 800 kPa, inter pressure = 250 kPa, purity of methane = 98.1%, recovery of *methane* = 79.7%, productivity = 3.83 mol of methane/h/kg)

2) Separation of hydrogen from CO₂.

After AD and SMR, resulting mixtures which consist of binary gas mixture (H₂-CO₂) and multicomponent gas mixture (H₂-CO-CO₂-CH₄), respectively. The fuel cell vehicles (FCV) require high purity (99.99%) hydrogen as a fuel. Thus, we eliminate the contaminants, CO, CO₂ and methane from the gas mixtures to obtain the high-purity of hydrogen.

There are some commercial technologies for hydrogen separation, such as Membrane separation, cryogenic distillation, and PSA. Among these technologies, PSA is the most feasible process to satisfy the fuel grade purity of hydrogen in terms of economics.

An adsorption isotherm in a single component is easily measured by experiment. However, to measure the adsorption amount for each component is difficult and has many errors. Also, it takes a lot of time. The adsorption of multicomponent gas mixture is predicted using the adsorption isotherm of pure gas. Binary gas (H₂-CO₂) and multicomponent gas (H₂-CO-CO₂-CH₄) mixture have a different behavior in the PSA column. Thus, two different experimental data and isotherm models were chosen according to references in which PSA experiment have been designed to work in conditions similar in feed gas

composition to the one modelled in this research^{7,8}. Extended Langmuir Freundlich isotherm and Dual-site Langmuir isotherm are used for binary and multicomponent mixture, respectively.

First, hydrogen separation in binary gas mixture (H₂-CO₂)

The Extended Langmuir Freundlich isotherm model is used for predicting the isotherm of binary gas mixture by following loading ratio correlation (LRC) equation (S3) as:

$$q_i = \frac{q_{m_i} B_i P_i^{\frac{1}{n_i}}}{1 + \sum_j^N B_j P_j^{\frac{1}{n_j}}} \quad (S3)$$

Where,

q_i : The adsorption amount of component i ,

q_m, B, n : Isotherm parameters,

P : The equilibrium pressure.

* The isotherm parameters are shown in Table S5⁹.

Second, hydrogen separation in multicomponent gas mixture (H₂-CO-CO₂-CH₄)

To design the PSA process, it is necessary to predict exactly the adsorption isotherm of the multicomponent gas mixture. Thus, the equilibrium isotherms are assumed to be described by Dual-Site Langmuir model⁷:

$$q_i = \frac{q_{m_i1} B_{i1} P y_i}{1 + \sum_k B_{k1} P y_k} + \frac{q_{m_i2} B_{i2} P y_i}{1 + \sum_k B_{k2} P y_k} \quad (S4)$$

$$q_{m1} = k_1, B_1 = k_2 \exp \frac{k_3}{T}, q_{m2} = k_4, B_2 = k_5 \exp \frac{k_6}{T}$$

Where,

q_i : The adsorption amount of component i ,

P : The equilibrium pressure,

y : The mole fraction in gaseous,

$k_1, k_2, k_3, k_4, k_5, k_6$: Isotherm parameters,

T : The equilibrium temperature.

Dual-Site Langmuir adsorption isotherm parameters for H₂, CO, CO₂, CH₄ are shown in Table S6.

The PSA process is designed by the following nine cycle steps: adsorption, first pressure equalization (I), provide purge, second pressure equalization (I), blow down, purge, second pressure equalization (II), first pressure equalization (II), and backfill. The cycle steps, experimental condition, and pressure change data required for PSA process were adopted through the following reference⁷.

Acetic acid (AA) extraction and conversion

1) AA extraction from resulting mixture of AD

The AA is present at low concentrations (5~6 wt%) in the resulting mixture of AD; as such, the efficient design of acetic acid recovery system is important in terms of process feasibility for bioethanol production. Previously, researchers have reported effective liquid–liquid extraction system using organic solvents¹⁰. Hexane was determined to be the most feasible extraction solvent based on ternary plot of the three-component system. The liquid–liquid extraction system was designed to recover 70% of the AA in the resulting mixture of AD by using ASPEN PLUS Simulators¹¹ (Fig. S3). A liquid–liquid extraction system using a hexane solvent was designed to recover AA. Here, hexane and the acetic acid solution (10 weight ratio, 30.6 t/d) were fed to a decanter at 35 °C, allowing for a 70% recovery of the acetic acid. After the extraction, 99% of acetic acid was obtained and most of the hexane was recycled to the decanter using two distillation columns. Consequently, 1.712–1.793 t of AA was produced/ton of FW.

2) AA conversion to bioethanol

A large-scale process producing bioethanol from acetic acid was designed based on the esterification of acetic acid and hydrogenolysis of methyl acetate^{12, 13}. The process consisted of four main subsystems: (1) esterification, (2) methyl acetate recovery, (3) hydrogenolysis, and (4) bioethanol recovery (Fig. S4).

A mixture of acetic acid and methanol (0.5 volume ratio, 3.5 t/d) was fed to an esterification reactor (R-1) producing methyl acetate in a 97% yield. The reaction mixture was then sent to a distillation column (D-1) to remove 0.4 t/d of water and obtain 3.0 kt/y (55.0 wt.%) of methyl acetate and methanol. The pure hydrogen (2.7 t/d) and methanol (10.0 t/d) excess streams were then charged with the concentrated mixture to a batch reactor (R-2) to generate to a hydrogenolysis reaction stream. The unreacted hydrogen (2.6 t/d) present in the gas phase of the resulting mixture were separated from the liquid phase (S-1) and the bioethanol (0.9 t/d) present in the liquid mixture in addition to S-1 was purified through a distillation column to a high purity (99.0 wt%).

Steam methane reforming (SMR)

The SMR technology can be used to maximize hydrogen production for FCV operation.

Mozdzierz, et al¹⁴ reported the experimental procedure for lab-scale production of hydrogen from SMR. Kinetics using a nickel-based catalyst with the advantages of high activity and low cost are obtained as follow.

$$R_{st} = \dot{w}_{cat} A_{st} \exp\left(-\frac{E_a}{RT}\right) P_{CH_4}^{0.89} P_{H_2O}^{0.05} \quad (S4)$$

$$A_{st} = 1.354 \times 10^{-3} [\text{mol s}^{-1} \text{g}^{-1} \text{Pa}^{-0.94}]$$

$$E_a = 122500 \text{ J/mol}$$

$$\text{SC (Steam to methane ratio)} = 2.$$

Optimal conditions were selected through the results according to conditions such as temperature and catalyst density. In order to increase the conversion rate, high-temperature conditions were selected, and instead, the density of the catalyst was lowered to prevent temperature changes due to strong endotherm at the reformer inlet. ($T = 1200 \text{ K} / \dot{w}_{cat} = 2.5 \times 10^5 \text{ g/m}^3$)

Process simulation models for SMR are developed by using the SuperPro Designer (Fig. S5). Using the selected reaction conditions, residence time of the reactor was 200 seconds. As a result, the conversion rate of methane is 87%, and hydrogen stream of 55 mol% can be obtained. On average, it can produce 2,000 mol/hour hydrogen.

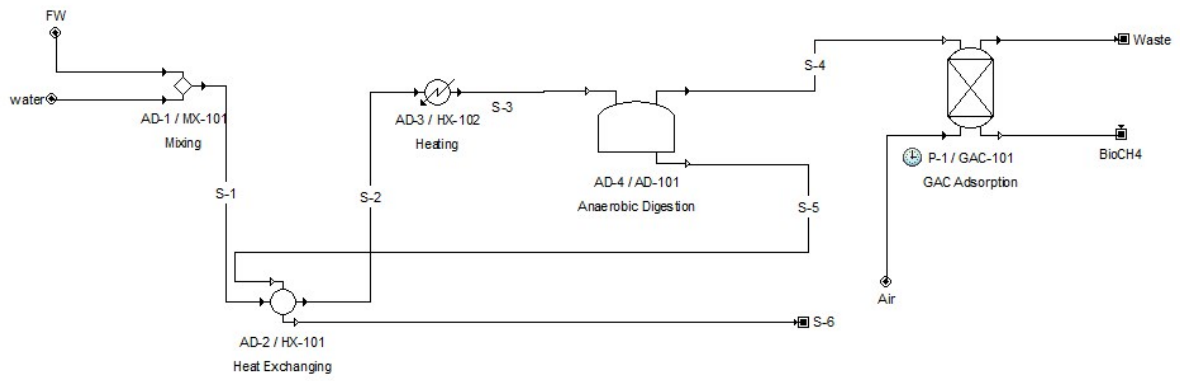


Fig. S1. Process flow diagram of AD with PSA for biomethane production

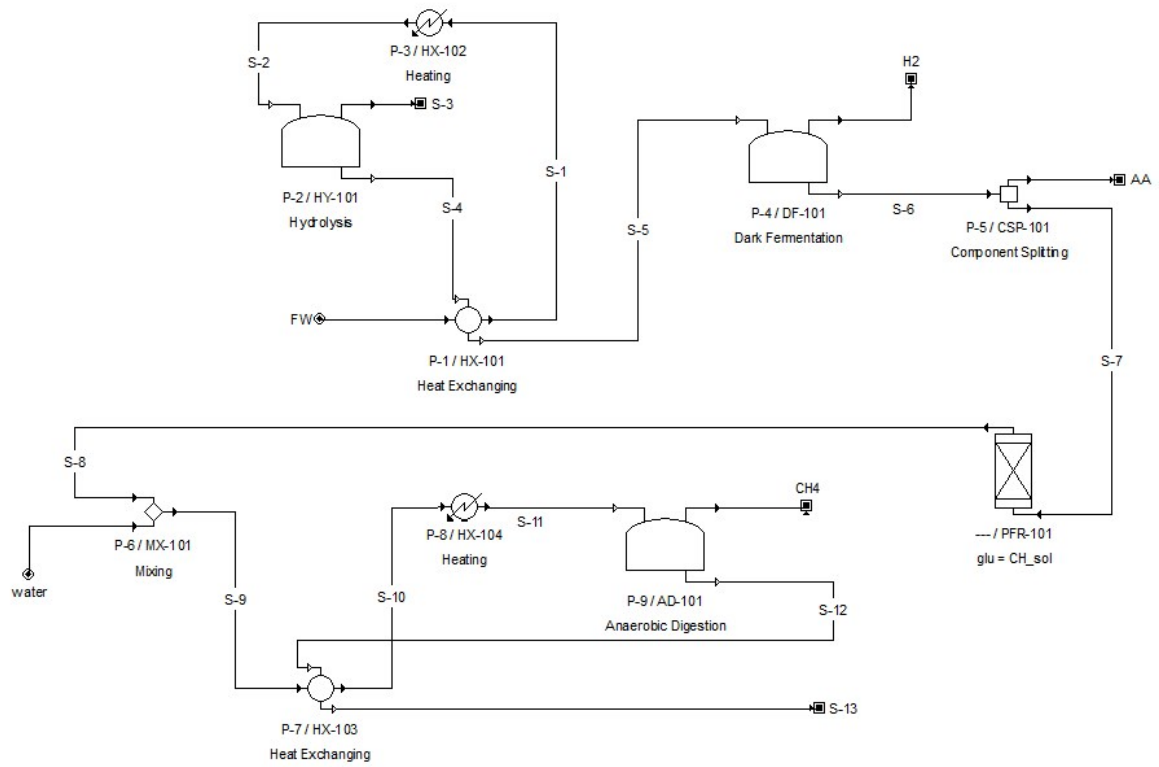


Fig. S2. Process flow diagram of AD for biohydrogen production

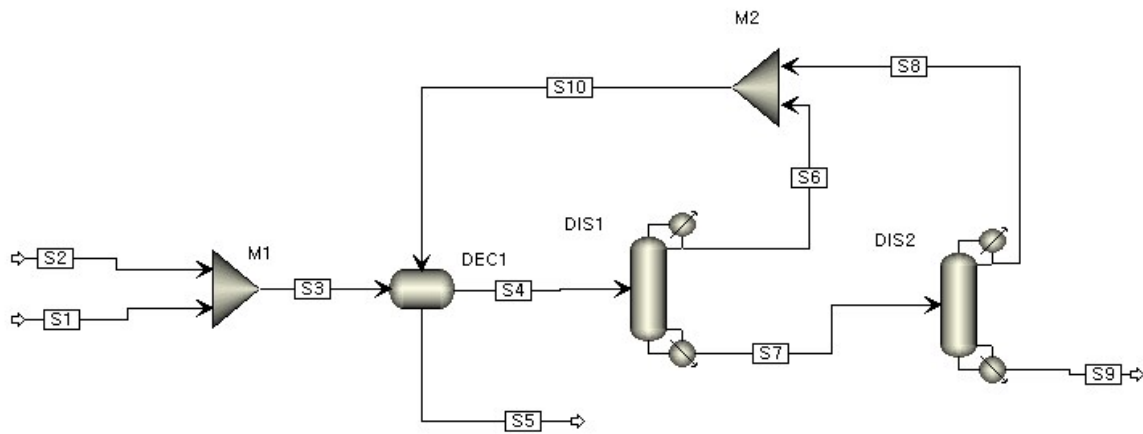


Fig. S3. Process flow diagram of AA extraction

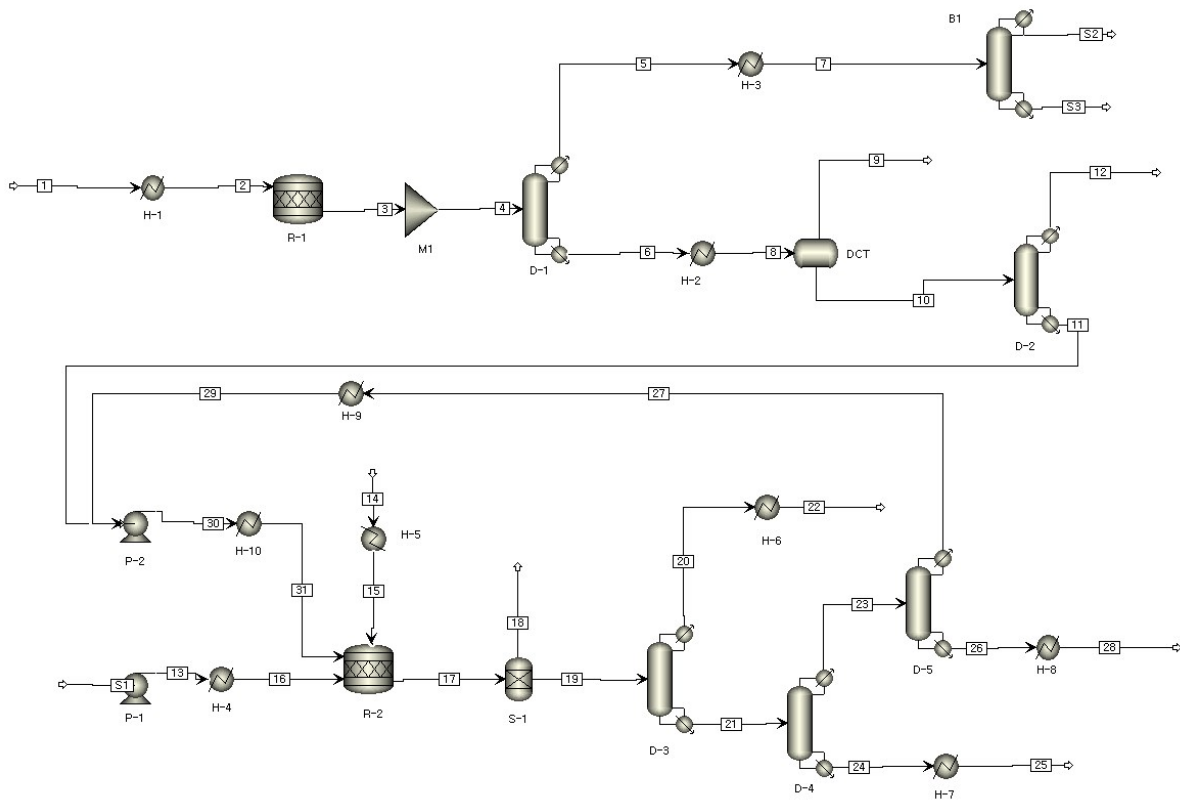


Fig. S4. Process flow diagram of AA conversion for bioethanol production

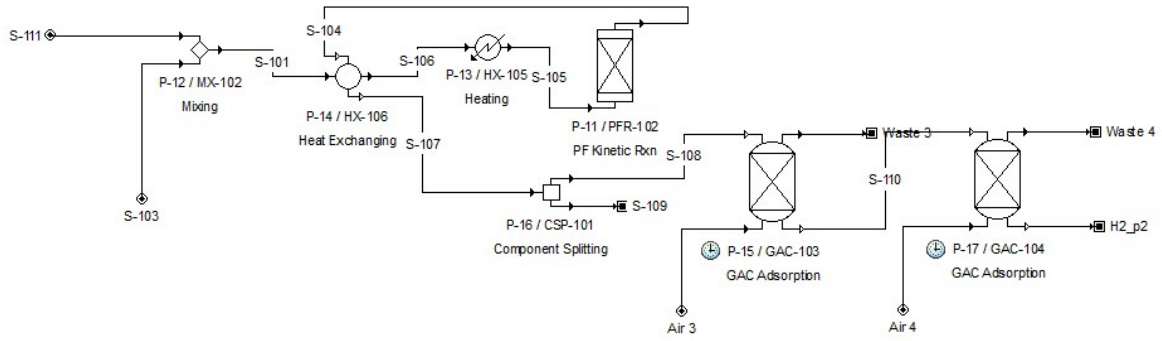


Fig. S5. Process flow diagram of SMR with PSA for hydrogen production

Table S5. Reaction kinetics of AD and DF

Conversion steps	Kinetic equations
Anaerobic digestion	
Carbohydrate hydrolysis	$R_S = k S$
Protein hydrolysis	$R_S = k S$
Acidogenic glucose degrading	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[(C_6H_{10}O_5)_s]}} \right)$
Lipolytic	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[GTO]}} \right)$
LCFA-degrading	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_{s, LCFA}}{[LCFA]} + \frac{[LCFA]}{K_{i, LCFA}}} \right)$
Amino acid-degrading	$\mu = \mu_{max}(T)$
Propionate-degrading	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[C_3H_6O_2]}} \right) \left(\frac{1}{1 + \frac{K_{i, C_2H_4O_2}}{[C_2H_4O_2]}} \right)$
Butyrate-degrading	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[C_4H_8O_2]}} \right) \left(\frac{1}{1 + \frac{K_{i, C_2H_4O_2}}{[C_2H_4O_2]}} \right)$
Valerate-degrading	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[C_5H_{10}O_2]}} \right) \left(\frac{1}{1 + \frac{K_{i, C_2H_4O_2}}{[C_2H_4O_2]}} \right)$
Acetoclastic methanogenic	$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[C_2H_4O_2]}} \right) \left(\frac{1}{1 + \frac{[NH_3]}{K_{i, NH_3}}} \right)$
Dark fermentation	
Glucose production	$R_S = k S$

Acetic acid production

$$\mu = \mu_{max}(T) \left(\frac{1}{1 + \frac{K_s}{[C_6H_{12}O_6]_s}} \right)$$

Table S6. Pure component parameter for Langmuir – Fledlich model on Zeolite 5A at 303K.

Component	q_m [mmol/g]	B [1/atm]	1/n
CO ₂	4.24466	7.94235	0.95176
CO	3.70819	0.3397	0.6647
H ₂	0.44963	0.04022	1.0817

Table S7. Pure component parameter for Dual-Site Langmuir model on Activated carbon and Zeolite 5A.

Component		k_1 [mmol/g]	k_2 [1/atm]	k_3 [K]	k_4 [mmol/g]	k_5 [1/atm]	k_6 [K]
Activated carbon	H ₂	0.0191	1.90E-05	1170	8.73E-04	4.98E-06	1.90E+03
	CO	0.00423	1.43E-05	2407.68	7.40E-04	2.29E-03	1760.96
	CH ₄	0.00576	7.44E-05	2157.02	7.09E-04	2.73E-02	1.47E+03
	CO ₂	0.00764	1.28E-04	2228.63	1.62E-03	2.53E-02	1724.6
Zeolite 5A	H ₂	0.00064	1.14E-04	1665.08	3.43E-06	1.96E-16	20848.3
	CO	0.00231	1.17E-04	2652.03	2.54E-03	4.29E-08	3755.31
	CH ₄	0.0022	2.08E-04	2298.51	7.31E-04	1.98E-12	7.28E+03
	CO ₂	0.00356	3.01E-03	2923.79	8.23E-04	5.78E-09	5478.58

S.3 Energetic analysis

Table S8. Potential energy production of GV operations using green energy

Types	Unit: kWh/t of FW			
	China	India	USA	Brazil
Biomethane	102.2	131.4	142.6	142.8
Bioethanol	205.1	214.7	215.0	214.6
Biohydrogen	133.6	145.4	154.1	153.2
Bioelectricity	17.6	23.0	23.1	18.7

Table S9. Potential driving distance of GV operations using green energy

Types	Unit: mile/t of FW			
	China	India	USA	Brazil
Biomethane	77.0	99.0	107.4	107.6
Bioethanol	174.1	182.2	182.5	182.1
Biohydrogen	220.2	239.6	254.1	252.6
Bioelectricity	51.3	66.9	67.4	54.5

Table S10. Energy requirements for GV operations

Types		Unit: kWh/mile			
		China	India	USA	Brazil
Biomethane	Primary	1.13	1.11	1.19	1.38
	Product	1.33	1.33	1.33	1.33
	Car	0.14	0.14	0.14	0.14
Bioethanol	Primary	8.16	7.06	6.14	5.85
	Product	1.18	1.18	1.18	1.18
	Car	0.14	0.14	0.14	0.14
Biohydrogen	Primary	0.05	0.09	0.13	0.18
	Product	0.61	0.61	0.61	0.61
	Car	0.24	0.24	0.24	0.24
Bioelectricity	Primary	0.74	0.72	0.82	1.14
	Product	0.34	0.34	0.34	0.34
	Car	0.24	0.24	0.24	0.24

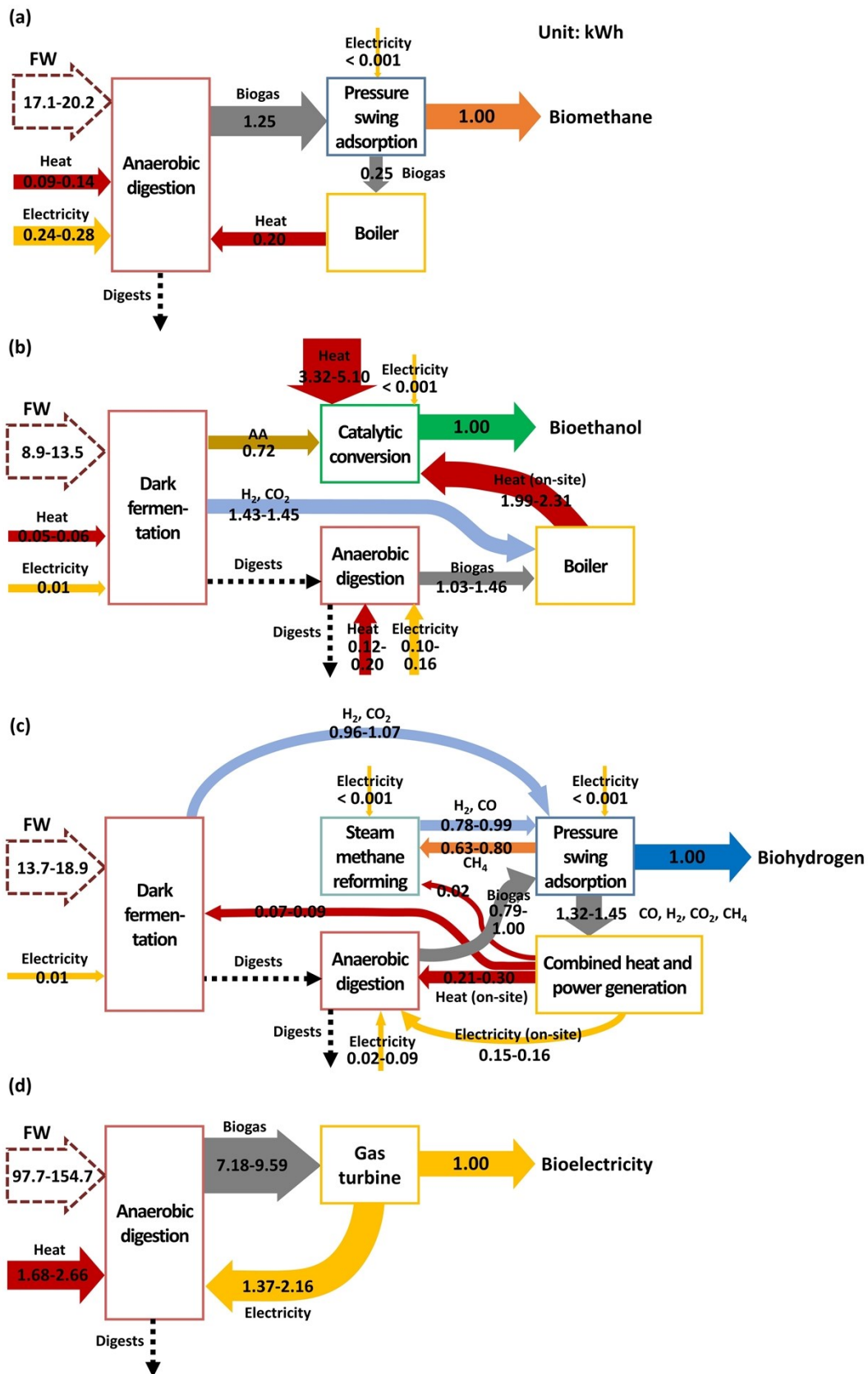


Fig. S6. Sankey diagram of selected pathways for food waste-based green vehicle fuel production. (a) P1 route-biomethane, (b) P2 route-bioethanol, (c) P3 route-biohydrogen, and (d) P4 route-bioelectricity. The boiler and gas turbine efficiency are assumed as 80% and 33%¹⁵.

S.4 Economic analysis

Table S11. Discounted cashflow sheet of biomethane production in China

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	3,086,045	23,145,341	12,344,182								
Land	1,848,000										
Working Capital			4,821,946								
Loan Payment				6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085
Loan Interest Payment	324,035	2,754,296	4,050,435	4,050,435	3,889,249	3,716,781	3,532,239	3,334,780	3,123,499	2,897,428	2,655,532
Loan Principal	4,629,068	39,347,079	57,863,352	55,560,702	53,096,866	50,460,561	47,639,716	44,621,411	41,391,824	37,936,167	34,238,614
Methane				29,739,231	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692
Other sales				1,546,439	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales				31,285,670	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051
Annual Manufacturing Cost				14,378,425							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				1,237,800	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				7,025,177	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523
Total Product Cost				21,938,728	22,830,510	22,830,510	22,830,510	22,830,510	23,365,635	22,830,510	22,830,510
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				12,754,125	21,857,840	15,610,193	11,147,588	7,970,213	7,961,288	7,970,213	3,980,644
Remaining Value				76,497,977	54,640,137	39,029,944	27,882,357	19,912,144	11,950,857	3,980,644	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				269,506	518,816	479,864	443,930	410,583	379,823	351,292	324,988
Remaining Value				6,917,312	6,398,495	5,918,632	5,474,702	5,064,119	4,684,296	4,333,004	4,008,016
Net Revenue				-7,727,124	-13,341,364	-6,882,295	-2,199,215	1,208,966	924,807	1,705,610	5,963,378
Losses Forward					-7,727,124	-21,068,488	-27,950,783	-30,149,998	-28,941,032	-28,016,225	-26,310,616
Taxable Income				-7,727,124	-21,068,488	-27,950,783	-30,149,998	-28,941,032	-28,016,225	-26,310,616	-20,347,237
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				2,993,857	6,571,457	6,571,457	6,571,457	6,571,457	6,036,331	6,571,457	6,571,457
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				2,721,688	5,430,956	4,937,233	4,488,393	4,080,358	3,407,352	3,372,196	3,065,633
TPI + Interest	6,362,277	28,489,600	21,216,562								
NPV			0								

Table S11. Discounted cashflow sheet of biomethane production in China (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	6,353,085	0	0	0	0
Loan Interest Payment	2,396,703	2,119,756	1,823,423	1,506,347	1,167,075	804,055	415,622	0	0	0	0
Loan Principal	30,282,232	26,048,903	21,519,241	16,672,503	11,486,493	5,937,463	0	0	0	0	0
Methane	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523
Total Product Cost	22,830,510	22,830,510	23,365,635	22,830,510	22,830,510	22,830,510	22,830,510	23,365,635	22,830,510	22,830,510	22,830,510
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	320,676	320,604	320,676	320,604	320,676	320,604	320,676	320,604	320,676	320,604	320,676
Remaining Value	3,687,340	3,366,737	3,046,061	2,725,457	2,404,781	2,084,177	1,763,501	1,442,897	1,122,222	801,618	480,942
Net Revenue	10,207,163	10,484,182	10,245,317	11,097,591	11,436,791	11,799,883	12,188,244	12,068,812	12,603,866	12,603,938	12,603,866
Losses Forward	-20,347,237	-10,140,074	0	0	0	0	0	0	0	0	0
Taxable Income	-10,140,074	344,107	10,245,317	11,097,591	11,436,791	11,799,883	12,188,244	12,068,812	12,603,866	12,603,938	12,603,866
Income Tax	0	120,438	3,585,861	3,884,157	4,002,877	4,129,959	4,265,885	4,224,084	4,411,353	4,411,378	4,411,353
Annual Cash Flow	6,571,457	6,451,019	2,450,470	2,687,300	2,568,580	2,441,498	2,305,571	8,165,332	8,513,189	8,513,164	8,513,189
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	2,786,939	2,487,147	858,875	856,257	744,026	642,923	551,935	1,777,014	1,684,289	1,531,167	1,391,974
TPI + Interest											
NPV											

Table S11. Discounted cashflow sheet of biomethane production in China (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-4,821,946
Loan Payment											
Loan Interest Payment											
Loan Principal											
Methane	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692	33,987,692
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051	35,755,051
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320	1,320,320
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523	7,493,523
Total Product Cost	22,830,510	23,365,635	22,830,510	22,830,510	22,830,510	22,830,510	23,365,635	22,830,510	22,830,510	22,830,510	22,830,510
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	320,604	160,338									
Remaining Value	160,338	0									
Net Revenue	12,603,938	12,229,078	12,924,542	12,924,542	12,924,542	12,924,542	12,389,416	12,924,542	12,924,542	12,924,542	12,924,542
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	12,603,938	12,229,078	12,924,542	12,924,542	12,924,542	12,924,542	12,389,416	12,924,542	12,924,542	12,924,542	12,924,542
Income Tax	4,411,378	4,280,177	4,523,590	4,523,590	4,523,590	4,523,590	4,336,296	4,523,590	4,523,590	4,523,590	4,523,590
Annual Cash Flow	8,513,164	8,109,239	8,400,952	8,400,952	8,400,952	8,400,952	8,053,121	8,400,952	8,400,952	8,400,952	8,400,952
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,265,428	1,095,806	1,032,023	938,203	852,912	775,374	675,701	640,805	582,550	529,591	481,446
TPI + Interest											-382,245
NPV											

Table S12. Discounted cashflow sheet of biomethane production in India

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	3,599,161	26,993,711	14,396,646								
Land	1,848,000										
Working Capital			5,623,690								
Loan Payment				7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411
Loan Interest Payment	377,912	3,212,252	4,723,899	4,723,899	4,535,914	4,334,769	4,119,544	3,889,253	3,642,842	3,379,182	3,097,066
Loan Principal	5,398,742	45,889,308	67,484,277	64,798,765	61,925,268	58,850,626	55,560,759	52,040,601	48,274,032	44,243,804	39,931,459
Methane				31,820,014	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730
Other sales				1,878,355	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales				33,698,369	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421
Annual Manufacturing Cost				14,713,240							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				1,572,615	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				7,350,201	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214
Total Product Cost				22,598,566	23,534,337	23,534,337	23,534,337	23,534,337	24,069,462	23,534,337	23,534,337
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				14,856,701	25,461,205	18,183,604	12,985,318	9,284,139	9,273,742	9,284,139	4,636,871
Remaining Value				89,109,018	63,647,813	45,464,209	32,478,891	23,194,752	13,921,010	4,636,871	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				319,053	614,198	568,084	525,544	486,066	449,652	415,875	384,735
Remaining Value				8,189,022	7,574,825	7,006,740	6,481,197	5,995,130	5,545,478	5,129,604	4,744,869
Net Revenue				-8,799,851	-15,633,232	-8,108,373	-2,652,322	1,318,626	1,076,723	1,898,889	6,859,412
Losses Forward					-8,799,851	-24,433,083	-32,541,456	-35,193,777	-33,875,151	-32,798,428	-30,899,539
Taxable Income				-8,799,851	-24,433,083	-32,541,456	-35,193,777	-33,875,151	-32,798,428	-30,899,539	-24,040,127
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				3,690,392	7,568,674	7,568,674	7,568,674	7,568,674	7,033,548	7,568,674	7,568,674
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				3,354,901	6,255,102	5,686,457	5,169,506	4,699,551	3,970,255	3,883,926	3,530,842
TPI + Interest	7,048,339	33,226,559	24,744,235								
NPV			0								

Table S12. Discounted cashflow sheet of biomethane production in India (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	7,409,411	0	0	0	0
Loan Interest Payment	2,795,202	2,472,208	2,126,603	1,756,807	1,361,125	937,744	484,728	0	0	0	0
Loan Principal	35,317,251	30,380,047	25,097,240	19,444,636	13,396,349	6,924,683	0	0	0	0	0
Methane	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730
Other sales	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214
Total Product Cost	23,534,337	23,534,337	24,069,462	23,534,337	23,534,337	23,534,337	23,534,337	24,069,462	23,534,337	23,534,337	23,534,337
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	379,630	379,545	379,630	379,545	379,630	379,545	379,630	379,545	379,630	379,545	379,630
Remaining Value	4,365,238	3,985,693	3,606,063	3,226,517	2,846,887	2,467,342	2,087,712	1,708,166	1,328,536	948,991	569,360
Net Revenue	11,803,252	12,126,332	11,936,725	12,841,732	13,237,330	13,660,795	14,113,726	14,063,414	14,598,454	14,598,539	14,598,454
Losses Forward	-24,040,127	-12,236,875	-110,544	0	0	0	0	0	0	0	0
Taxable Income	-12,236,875	-110,544	11,826,182	12,841,732	13,237,330	13,660,795	14,113,726	14,063,414	14,598,454	14,598,539	14,598,454
Income Tax	0	0	4,139,164	4,494,606	4,633,065	4,781,278	4,939,804	4,922,195	5,109,459	5,109,489	5,109,459
Annual Cash Flow	7,568,674	7,568,674	2,894,385	3,074,067	2,935,608	2,787,395	2,628,869	9,520,764	9,868,626	9,868,596	9,868,626
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,209,856	2,918,051	1,014,464	979,493	850,341	734,008	629,330	2,071,996	1,952,455	1,774,954	1,613,599
TPI + Interest											
NPV											

Table S12. Discounted cashflow sheet of biomethane production in India (continued)

Year	20	21	22	23	24	25	26	27	28	29	30	
Capital Investment												
Land												-1,848,000
Working Capital												-5,623,690
Loan Payment												
Loan Interest Payment												
Loan Principal												
Methane	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730	36,365,730
Other sales	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421	38,512,421
Annual Manufacturing Cost												
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456	1,677,456
Baghouse Bags		535,125					535,125					
Fixed Operating Costs	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214	7,840,214
Total Product Cost	23,534,337	24,069,462	23,534,337	23,534,337	23,534,337	23,534,337	24,069,462	23,534,337	23,534,337	23,534,337	23,534,337	23,534,337
Annual Depreciation												
<u>General Plant</u>												
Depreciation Charge												
Remaining Value												
<u>Heat and Power Plant</u>	4.46%	2.23%										
Depreciation Charge	379,545	189,815										
Remaining Value	189,815	0										
Net Revenue	14,598,539	14,253,144	14,978,084	14,978,084	14,978,084	14,978,084	14,442,959	14,978,084	14,978,084	14,978,084	14,978,084	14,978,084
Losses Forward	0	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	14,598,539	14,253,144	14,978,084	14,978,084	14,978,084	14,978,084	14,442,959	14,978,084	14,978,084	14,978,084	14,978,084	14,978,084
Income Tax	5,109,489	4,988,600	5,242,330	5,242,330	5,242,330	5,242,330	5,055,036	5,242,330	5,242,330	5,242,330	5,242,330	5,242,330
Annual Cash Flow	9,868,596	9,454,359	9,735,755	9,735,755	9,735,755	9,735,755	9,387,923	9,735,755	9,735,755	9,735,755	9,735,755	9,735,755
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.06
Annual Present Value	1,466,904	1,277,573	1,195,998	1,087,271	988,428	898,571	787,698	742,621	675,110	613,736	557,942	557,942
TPI + Interest												-428,192
NPV												

Table S13. Discounted cashflow sheet of biomethane production in USA

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	3,906,135	29,296,012	15,624,540								
Land	1,848,000										
Working Capital			6,103,336								
Loan Payment				8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362
Loan Interest Payment	410,144	3,486,225	5,126,802	5,126,802	4,922,783	4,704,482	4,470,901	4,220,969	3,953,541	3,667,394	3,361,216
Loan Principal	5,859,202	49,803,220	73,240,029	70,325,470	67,206,891	63,870,012	60,299,551	56,479,158	52,391,338	48,017,370	43,337,224
Methane				32,890,460	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097
Other sales				2,290,488	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales				35,180,948	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798
Annual Manufacturing Cost				14,950,984							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				1,810,359	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				7,549,360	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651
Total Product Cost				23,035,469	24,000,367	24,000,367	24,000,367	24,000,367	24,535,492	24,000,367	24,000,367
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				16,159,291	27,693,565	19,777,887	14,123,831	10,098,143	10,086,835	10,098,143	5,043,418
Remaining Value				96,921,822	69,228,257	49,450,371	35,326,540	25,228,396	15,141,561	5,043,418	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				336,960	648,671	599,969	555,041	513,347	474,889	439,216	406,329
Remaining Value				8,648,643	7,999,972	7,400,003	6,844,963	6,331,615	5,856,726	5,417,510	5,011,181
Net Revenue				-9,477,575	-17,058,587	-8,875,907	-2,943,342	1,373,971	1,156,040	2,001,677	7,395,468
Losses Forward					-9,477,575	-26,536,162	-35,412,069	-38,355,411	-36,981,439	-35,825,399	-33,823,722
Taxable Income				-9,477,575	-26,536,162	-35,412,069	-38,355,411	-36,981,439	-35,825,399	-33,823,722	-26,428,253
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				4,104,117	8,165,069	8,165,069	8,165,069	8,165,069	7,629,944	8,165,069	8,165,069
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				3,731,015	6,747,991	6,134,537	5,576,852	5,069,866	4,306,904	4,189,972	3,809,065
TPI + Interest	7,458,778	36,060,461	26,854,677								
NPV			0								

Table S13. Discounted cashflow sheet of biomethane production in USA (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	8,041,362	0	0	0	0
Loan Interest Payment	3,033,606	2,683,063	2,307,982	1,906,645	1,477,215	1,017,725	526,070	0	0	0	0
Loan Principal	38,329,469	32,971,170	27,237,790	21,103,074	14,538,928	7,515,291	0	0	0	0	0
Methane	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097
Other sales	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651
Total Product Cost	24,000,367	24,000,367	24,535,492	24,000,367	24,000,367	24,000,367	24,000,367	24,535,492	24,000,367	24,000,367	24,000,367
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	400,938	400,848	400,938	400,848	400,938	400,848	400,938	400,848	400,938	400,848	400,938
Remaining Value	4,610,243	4,209,395	3,808,458	3,407,610	3,006,673	2,605,825	2,204,887	1,804,039	1,403,102	1,002,254	601,317
Net Revenue	12,771,887	13,122,520	12,962,386	13,898,938	14,328,278	14,787,858	15,279,423	15,270,458	15,805,493	15,805,583	15,805,493
Losses Forward	-26,428,253	-13,656,366	-533,846	0	0	0	0	0	0	0	0
Taxable Income	-13,656,366	-533,846	12,428,540	13,898,938	14,328,278	14,787,858	15,279,423	15,270,458	15,805,493	15,805,583	15,805,493
Income Tax	0	0	4,349,989	4,864,628	5,014,897	5,175,750	5,347,798	5,344,660	5,531,923	5,531,954	5,531,923
Annual Cash Flow	8,165,069	8,165,069	3,279,955	3,300,441	3,150,172	2,989,319	2,817,271	10,326,645	10,674,508	10,674,477	10,674,508
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,462,786	3,147,988	1,149,604	1,051,622	912,493	787,181	674,432	2,247,379	2,111,895	1,919,898	1,745,367
TPI + Interest											
NPV											

Table S13. Discounted cashflow sheet of biomethane production in USA (continued)

Year	20	21	22	23	24	25	26	27	28	29	30	
Capital Investment												
Land												-1,848,000
Working Capital												-6,103,336
Loan Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0	0
Methane	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097	37,589,097
Other sales	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798	40,206,798
Annual Manufacturing Cost												
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049	1,931,049
Baghouse Bags		535,125					535,125					
Fixed Operating Costs	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651	8,052,651
Total Product Cost	24,000,367	24,535,492	24,000,367	24,000,367	24,000,367	24,000,367	24,535,492	24,000,367	24,000,367	24,000,367	24,000,367	24,000,367
Annual Depreciation												
<u>General Plant</u>												
Depreciation Charge												
Remaining Value												
<u>Heat and Power Plant</u>	4.46%	2.23%										
Depreciation Charge	400,848	200,469										
Remaining Value	200,469	0										
Net Revenue	15,805,583	15,470,837	16,206,431	16,206,431	16,206,431	16,206,431	15,671,305	16,206,431	16,206,431	16,206,431	16,206,431	16,206,431
Losses Forward	0	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	15,805,583	15,470,837	16,206,431	16,206,431	16,206,431	16,206,431	15,671,305	16,206,431	16,206,431	16,206,431	16,206,431	16,206,431
Income Tax	5,531,954	5,414,793	5,672,251	5,672,251	5,672,251	5,672,251	5,484,957	5,672,251	5,672,251	5,672,251	5,672,251	5,672,251
Annual Cash Flow	10,674,477	10,256,513	10,534,180	10,534,180	10,534,180	10,534,180	10,186,348	10,534,180	10,534,180	10,534,180	10,534,180	10,534,180
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.06
Annual Present Value	1,586,693	1,385,968	1,294,082	1,176,438	1,069,489	972,263	854,690	803,523	730,475	664,068	603,699	603,699
TPI + Interest												-455,680
NPV												

Table S14. Discounted cashflow sheet of biomethane production in Brazil

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,188,164	31,411,234	16,752,658								
Land	1,848,000										
Working Capital			6,544,007								
Loan Payment				8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961
Loan Interest Payment	439,757	3,737,937	5,496,966	5,496,966	5,278,216	5,044,154	4,793,707	4,525,730	4,238,993	3,932,186	3,603,901
Loan Principal	6,282,247	53,399,097	78,528,084	75,403,088	72,059,343	68,481,535	64,653,281	60,557,050	56,174,082	51,484,306	46,466,246
Methane				34,119,889	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159
Other sales				2,469,219	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales				36,589,108	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123
Annual Manufacturing Cost				15,213,115							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				2,072,490	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				7,738,742	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658
Total Product Cost				23,486,982	24,481,980	24,481,980	24,481,980	24,481,980	25,017,106	24,481,980	24,481,980
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				17,417,410	29,849,711	21,317,740	15,223,475	10,884,358	10,872,169	10,884,358	5,436,085
Remaining Value				104,467,896	74,618,184	53,300,444	38,076,970	27,192,612	16,320,442	5,436,085	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				337,306	649,337	600,585	555,611	513,875	475,377	439,667	406,746
Remaining Value				8,657,528	8,008,191	7,407,605	6,851,995	6,338,120	5,862,743	5,423,075	5,016,329
Net Revenue				-10,149,556	-18,443,122	-9,628,336	-3,238,650	1,410,181	1,212,478	2,077,932	7,887,411
Losses Forward					-10,149,556	-28,592,678	-38,221,014	-41,459,664	-40,049,483	-38,837,005	-36,759,073
Taxable Income				-10,149,556	-28,592,678	-38,221,014	-41,459,664	-40,049,483	-38,837,005	-36,759,073	-28,871,663
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				4,480,164	8,712,182	8,712,182	8,712,182	8,712,182	8,177,056	8,712,182	8,712,182
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,072,877	7,200,150	6,545,591	5,950,537	5,409,579	4,615,735	4,470,727	4,064,297
TPI + Interest	7,835,865	38,664,087	28,793,631								
NPV			0								

Table S14. Discounted cashflow sheet of biomethane production in Brazil (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	8,621,961	0	0	0
Loan Interest Payment	3,252,637	2,876,784	2,474,622	2,044,308	1,583,873	1,091,206	564,054	0	0	0	0
Loan Principal	41,096,921	35,351,744	29,204,405	22,626,752	15,588,663	8,057,908	0	0	0	0	0
Methane	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159
Other sales	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658
Total Product Cost	24,481,980	24,481,980	25,017,106	24,481,980	24,481,980	24,481,980	24,481,980	25,017,106	24,481,980	24,481,980	24,481,980
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	401,349	401,260	401,349	401,260	401,349	401,260	401,349	401,260	401,349	401,260	401,349
Remaining Value	4,614,979	4,213,720	3,812,370	3,411,111	3,009,761	2,608,502	2,207,152	1,805,893	1,404,543	1,003,284	601,934
Net Revenue	13,680,156	14,056,099	13,923,046	14,888,575	15,348,921	15,841,677	16,368,740	16,397,758	16,932,794	16,932,884	16,932,794
Losses Forward	-28,871,663	-15,191,506	-1,135,407	0	0	0	0	0	0	0	0
Taxable Income	-15,191,506	-1,135,407	12,787,639	14,888,575	15,348,921	15,841,677	16,368,740	16,397,758	16,932,794	16,932,884	16,932,794
Income Tax	0	0	4,475,674	5,211,001	5,372,122	5,544,587	5,729,059	5,739,215	5,926,478	5,926,509	5,926,478
Annual Cash Flow	8,712,182	8,712,182	3,701,383	3,501,180	3,340,059	3,167,595	2,983,123	11,059,802	11,407,665	11,407,634	11,407,665
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,694,815	3,358,923	1,297,312	1,115,584	967,496	834,127	714,136	2,406,935	2,256,946	2,051,763	1,865,244
TPI + Interest											
NPV											

Table S14. Discounted cashflow sheet of biomethane production in Brazil (continued)

Year	20	21	22	23	24	25	26	27	28	29	30	
Capital Investment												
Land												-1,848,000
Working Capital												-6,544,007
Loan Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0	0
Methane	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159	38,994,159
Other sales	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123	41,816,123
Annual Manufacturing Cost												
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656	2,210,656
Baghouse Bags		535,125					535,125					
Fixed Operating Costs	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658	8,254,658
Total Product Cost	24,481,980	25,017,106	24,481,980	24,481,980	24,481,980	24,481,980	25,017,106	24,481,980	24,481,980	24,481,980	24,481,980	24,481,980
Annual Depreciation												
<u>General Plant</u>												
Depreciation Charge												
Remaining Value												
<u>Heat and Power Plant</u>	4.46%	2.23%										
Depreciation Charge	401,260	200,675										
Remaining Value	200,675	0										
Net Revenue	16,932,884	16,598,343	17,334,143	17,334,143	17,334,143	17,334,143	16,799,018	17,334,143	17,334,143	17,334,143	17,334,143	17,334,143
Losses Forward	0	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	16,932,884	16,598,343	17,334,143	17,334,143	17,334,143	17,334,143	16,799,018	17,334,143	17,334,143	17,334,143	17,334,143	17,334,143
Income Tax	5,926,509	5,809,420	6,066,950	6,066,950	6,066,950	6,066,950	5,879,656	6,066,950	6,066,950	6,066,950	6,066,950	6,066,950
Annual Cash Flow	11,407,634	10,989,598	11,267,193	11,267,193	11,267,193	11,267,193	10,919,361	11,267,193	11,267,193	11,267,193	11,267,193	11,267,193
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.06
Annual Present Value	1,695,672	1,485,031	1,384,129	1,258,299	1,143,909	1,039,917	916,194	859,435	781,305	710,277	645,707	645,707
TPI + Interest												-480,934
NPV												

Table S15. Discounted cashflow sheet of bioethanol production in China

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	8,674,023	65,055,169	34,696,090								
Land	1,848,000										
Working Capital			13,553,160								
Loan Payment				17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770
Loan Interest Payment	910,772	7,741,565	11,384,655	11,384,655	10,931,606	10,446,845	9,928,150	9,373,147	8,779,293	8,143,870	7,463,967
Loan Principal	13,011,034	110,593,787	162,637,922	156,165,807	149,240,644	141,830,719	133,902,100	125,418,477	116,341,001	106,628,102	96,235,299
Ethanol				63,621,369	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136
Other sales				1,546,439	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales				65,167,808	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495
Annual Manufacturing Cost				26,475,960							
Raw Material cost				13,684,049	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318
Utility cost				12,791,912	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				10,101,739	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188
Total Product Cost				37,112,825	39,016,213	39,016,213	39,016,213	39,016,213	39,551,338	39,016,213	39,016,213
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				31,194,393	53,460,510	38,179,841	27,265,078	19,493,767	19,471,937	19,493,767	9,735,969
Remaining Value				187,100,870	133,640,360	95,460,518	68,195,440	48,701,673	29,229,736	9,735,969	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				1,978,798	3,809,318	3,523,315	3,259,476	3,014,632	2,788,786	2,579,297	2,386,166
Remaining Value				50,789,143	46,979,825	43,456,510	40,197,034	37,182,402	34,393,616	31,814,319	29,428,153
Net Revenue				-16,502,862	-32,740,152	-16,688,720	-4,991,422	3,579,736	3,886,140	5,244,348	15,875,180
Losses Forward					-16,502,862	-49,243,014	-65,931,733	-70,923,155	-67,343,419	-63,457,279	-58,212,931
Taxable Income				-16,502,862	-49,243,014	-65,931,733	-70,923,155	-67,343,419	-63,457,279	-58,212,931	-42,337,750
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				10,198,214	17,604,513	17,604,513	17,604,513	17,604,513	17,069,387	17,604,513	17,604,513
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				9,271,103	14,549,184	13,226,531	12,024,119	10,931,017	9,635,224	9,033,899	8,212,635
TPI + Interest	13,833,682	80,076,407	59,633,905								
NPV			0								

Table S15. Discounted cashflow sheet of bioethanol production in China (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	17,856,770	0	0	0	0
Loan Interest Payment	6,736,471	5,958,050	5,125,140	4,233,926	3,280,326	2,259,975	1,168,200	0	0	0	0
Loan Principal	85,115,001	73,216,281	60,484,651	46,861,807	32,285,364	16,688,570	0	0	0	0	0
Ethanol	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495
Annual Manufacturing Cost											
Raw Material cost	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318
Utility cost	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188
Total Product Cost	39,016,213	39,016,213	39,551,338	39,016,213	39,016,213	39,016,213	39,016,213	39,551,338	39,016,213	39,016,213	39,016,213
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	2,354,506	2,353,978	2,354,506	2,353,978	2,354,506	2,353,978	2,354,506	2,353,978	2,354,506	2,353,978	2,354,506
Remaining Value	27,073,647	24,719,669	22,365,164	20,011,186	17,656,681	15,302,703	12,948,197	10,594,219	8,239,714	5,885,736	3,531,231
Net Revenue	26,370,306	27,149,254	27,446,512	28,873,379	29,826,450	30,847,329	31,938,577	32,572,179	33,106,777	33,107,304	33,106,777
Losses Forward	-42,337,750	-15,967,445	0	0	0	0	0	0	0	0	0
Taxable Income	-15,967,445	11,181,810	27,446,512	28,873,379	29,826,450	30,847,329	31,938,577	32,572,179	33,106,777	33,107,304	33,106,777
Income Tax	0	3,913,633	9,606,279	10,105,683	10,439,258	10,796,565	11,178,502	11,400,263	11,587,372	11,587,557	11,587,372
Annual Cash Flow	17,604,513	13,690,879	7,463,108	7,498,830	7,165,255	6,807,948	6,426,011	23,525,894	23,873,910	23,873,726	23,873,910
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	7,466,032	5,278,427	2,615,774	2,389,358	2,075,519	1,792,745	1,538,336	5,119,920	4,723,326	4,293,899	3,903,575
TPI + Interest											
NPV											

Table S15. Discounted cashflow sheet of bioethanol production in China (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-13,553,160
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Ethanol	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136	72,710,136
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495	74,477,495
Annual Manufacturing Cost											
Raw Material cost	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318	14,596,318
Utility cost	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706	13,644,706
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188	10,775,188
Total Product Cost	39,016,213	39,551,338	39,016,213	39,016,213	39,016,213	39,016,213	39,551,338	39,016,213	39,016,213	39,016,213	39,016,213
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	2,353,978	1,177,253									
Remaining Value	1,177,253	0									
Net Revenue	33,107,304	33,748,904	35,461,282	35,461,282	35,461,282	35,461,282	34,926,157	35,461,282	35,461,282	35,461,282	35,461,282
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	33,107,304	33,748,904	35,461,282	35,461,282	35,461,282	35,461,282	34,926,157	35,461,282	35,461,282	35,461,282	35,461,282
Income Tax	11,587,557	11,812,116	12,411,449	12,411,449	12,411,449	12,411,449	12,224,155	12,411,449	12,411,449	12,411,449	12,411,449
Annual Cash Flow	23,873,726	23,114,040	23,049,834	23,049,834	23,049,834	23,049,834	22,702,002	23,049,834	23,049,834	23,049,834	23,049,834
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	3,548,677	3,123,413	2,831,579	2,574,163	2,340,148	2,127,407	1,904,822	1,758,188	1,598,353	1,453,048	1,320,953
TPI + Interest											-882,618
NPV											

Table S16. Discounted cashflow sheet of bioethanol production in India

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	9,232,894	69,246,702	36,931,575								
Land	1,848,000										
Working Capital			14,426,396								
Loan Payment				19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289
Loan Interest Payment	969,454	8,240,358	12,118,173	12,118,173	11,635,935	11,119,940	10,567,826	9,977,063	9,344,947	8,668,583	7,944,874
Loan Principal	13,849,340	117,719,394	173,116,756	166,227,640	158,856,285	150,968,936	142,529,472	133,499,246	123,836,904	113,498,198	102,435,782
Ethanol				66,525,167	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762
Other sales				42,324	48,370	48,370	48,370	48,370	48,370	48,370	48,370
Total Annual Sales				66,567,491	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133
Annual Manufacturing Cost				25,563,660							
Raw Material cost				13,709,320	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275
Utility cost				11,854,339	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				10,417,480	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979
Total Product Cost				36,516,265	38,379,882	38,379,882	38,379,882	38,379,882	38,915,008	38,379,882	38,379,882
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				33,117,460	56,756,235	40,533,546	28,945,912	20,695,516	20,672,340	20,695,516	10,336,170
Remaining Value				198,635,235	141,879,000	101,345,454	72,399,542	51,704,026	31,031,686	10,336,170	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				2,129,071	4,098,604	3,790,882	3,507,006	3,243,569	3,000,571	2,775,173	2,567,376
Remaining Value				54,646,160	50,547,556	46,756,674	43,249,668	40,006,099	37,005,528	34,230,355	31,662,979
Net Revenue				-17,313,478	-34,793,523	-17,747,118	-5,323,493	3,781,103	4,144,266	5,557,978	16,848,830
Losses Forward					-17,313,478	-52,107,002	-69,854,120	-75,177,613	-71,396,510	-67,252,244	-61,694,265
Taxable Income				-17,313,478	-52,107,002	-69,854,120	-75,177,613	-71,396,510	-67,252,244	-61,694,265	-44,845,435
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				11,043,937	18,689,961	18,689,961	18,689,961	18,689,961	18,154,836	18,689,961	18,689,961
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				10,039,942	15,446,249	14,042,044	12,765,495	11,604,995	10,247,931	9,590,905	8,719,005
TPI + Interest	14,580,920	85,235,766	63,476,144								
NPV			0								

Table S16. Discounted cashflow sheet of bioethanol production in India (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	19,007,289	0	0	0	0
Loan Interest Payment	7,170,505	6,341,930	5,455,355	4,506,719	3,491,679	2,405,587	1,243,468	0	0	0	0
Loan Principal	90,598,998	77,933,639	64,381,704	49,881,134	34,365,524	17,763,822	0	0	0	0	0
Ethanol	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762
Other sales	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370
Total Annual Sales	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133
Annual Manufacturing Cost											
Raw Material cost	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275
Utility cost	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979
Total Product Cost	38,379,882	38,379,882	38,915,008	38,379,882	38,379,882	38,379,882	38,379,882	38,915,008	38,379,882	38,379,882	38,379,882
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	2,533,311	2,532,743	2,533,311	2,532,743	2,533,311	2,532,743	2,533,311	2,532,743	2,533,311	2,532,743	2,533,311
Remaining Value	29,129,668	26,596,925	24,063,614	21,530,871	18,997,560	16,464,817	13,931,506	11,398,763	8,865,452	6,332,709	3,799,398
Net Revenue	27,993,435	28,822,577	29,173,459	30,657,788	31,672,260	32,758,921	33,920,472	34,629,382	35,163,940	35,164,507	35,163,940
Losses Forward	-44,845,435	-16,852,000	0	0	0	0	0	0	0	0	0
Taxable Income	-16,852,000	11,970,577	29,173,459	30,657,788	31,672,260	32,758,921	33,920,472	34,629,382	35,163,940	35,164,507	35,163,940
Income Tax	0	4,189,702	10,210,711	10,730,226	11,085,291	11,465,622	11,872,165	12,120,284	12,307,379	12,307,578	12,307,379
Annual Cash Flow	18,689,961	14,500,259	7,944,125	7,959,735	7,604,670	7,224,339	6,817,796	25,041,841	25,389,872	25,389,673	25,389,872
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	7,926,368	5,590,478	2,784,367	2,536,217	2,202,802	1,902,394	1,632,126	5,449,834	5,023,251	4,566,556	4,151,447
TPI + Interest											
NPV											

Table S16. Discounted cashflow sheet of bioethanol production in India (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-14,426,396
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Ethanol	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762	76,028,762
Other sales	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370	48,370
Total Annual Sales	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133	76,077,133
Annual Manufacturing Cost											
Raw Material cost	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275	14,623,275
Utility cost	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629	12,644,629
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979	11,111,979
Total Product Cost	38,379,882	38,915,008	38,379,882	38,379,882	38,379,882	38,379,882	38,915,008	38,379,882	38,379,882	38,379,882	38,379,882
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	2,532,743	1,266,655									
Remaining Value	1,266,655	0									
Net Revenue	35,164,507	35,895,470	37,697,250	37,697,250	37,697,250	37,697,250	37,162,125	37,697,250	37,697,250	37,697,250	37,697,250
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	35,164,507	35,895,470	37,697,250	37,697,250	37,697,250	37,697,250	37,162,125	37,697,250	37,697,250	37,697,250	37,697,250
Income Tax	12,307,578	12,563,414	13,194,038	13,194,038	13,194,038	13,194,038	13,006,744	13,194,038	13,194,038	13,194,038	13,194,038
Annual Cash Flow	25,389,673	24,598,711	24,503,213	24,503,213	24,503,213	24,503,213	24,155,381	24,503,213	24,503,213	24,503,213	24,503,213
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	3,774,013	3,324,038	3,010,121	2,736,474	2,487,703	2,261,548	2,026,768	1,869,048	1,699,135	1,544,668	1,404,244
TPI + Interest											-932,662
NPV											

Table S17. Discounted cashflow sheet of bioethanol production in USA

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	9,622,447	72,168,355	38,489,790								
Land	1,848,000										
Working Capital			15,035,074								
Loan Payment				19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244
Loan Interest Payment	1,010,357	8,588,034	12,629,462	12,629,462	12,126,877	11,589,112	11,013,703	10,398,015	9,739,229	9,034,328	8,280,084
Loan Principal	14,433,671	122,686,204	180,420,889	173,241,107	165,558,741	157,338,609	148,543,068	139,131,839	129,061,824	118,286,908	106,757,747
Ethanol				66,946,605	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406
Other sales				51,915	59,331	59,331	59,331	59,331	59,331	59,331	59,331
Total Annual Sales				66,998,520	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737
Annual Manufacturing Cost				24,356,730							
Raw Material cost				13,710,326	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348
Utility cost				10,646,404	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				10,626,720	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168
Total Product Cost				35,518,576	37,315,681	37,315,681	37,315,681	37,315,681	37,850,806	37,315,681	37,315,681
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				34,355,131	58,877,338	42,048,373	30,027,683	21,468,952	21,444,910	21,468,952	10,722,455
Remaining Value				206,058,663	147,181,325	105,132,952	75,105,269	53,636,317	32,191,407	10,722,455	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				2,260,788	4,352,168	4,025,409	3,723,970	3,444,236	3,186,204	2,946,862	2,726,209
Remaining Value				58,026,899	53,674,731	49,649,322	45,925,351	42,481,116	39,294,912	36,348,049	33,621,840
Net Revenue				-17,765,438	-36,102,328	-18,408,837	-5,511,300	3,942,854	4,348,587	5,803,915	17,525,308
Losses Forward					-17,765,438	-53,867,766	-72,276,603	-77,787,902	-73,845,048	-69,496,461	-63,692,547
Taxable Income				-17,765,438	-53,867,766	-72,276,603	-77,787,902	-73,845,048	-69,496,461	-63,692,547	-46,167,238
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				11,670,700	19,444,812	19,444,812	19,444,812	19,444,812	18,909,687	19,444,812	19,444,812
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				10,609,727	16,070,093	14,609,175	13,281,069	12,073,699	10,674,025	9,978,263	9,071,148
TPI + Interest	15,101,773	88,832,029	66,154,326								
NPV			0								

Table S17. Discounted cashflow sheet of bioethanol production in USA (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	19,809,244	0	0	0	0
Loan Interest Payment	7,473,042	6,609,508	5,685,527	4,696,867	3,639,000	2,507,083	1,295,932	0	0	0	0
Loan Principal	94,421,546	81,221,810	67,098,093	51,985,716	35,815,473	18,513,312	0	0	0	0	0
Ethanol	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406
Other sales	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331
Total Annual Sales	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737
Annual Manufacturing Cost											
Raw Material cost	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348
Utility cost	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168
Total Product Cost	37,315,681	37,315,681	37,850,806	37,315,681	37,315,681	37,315,681	37,315,681	37,850,806	37,315,681	37,315,681	37,315,681
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	2,690,037	2,689,434	2,690,037	2,689,434	2,690,037	2,689,434	2,690,037	2,689,434	2,690,037	2,689,434	2,690,037
Remaining Value	30,931,804	28,242,370	25,552,333	22,862,900	20,172,863	17,483,429	14,793,393	12,103,959	9,413,922	6,724,489	4,034,452
Net Revenue	29,090,977	29,955,114	30,343,367	31,867,756	32,925,019	34,057,539	35,268,088	36,029,497	36,564,020	36,564,622	36,564,020
Losses Forward	-46,167,238	-17,076,261	0	0	0	0	0	0	0	0	0
Taxable Income	-17,076,261	12,878,853	30,343,367	31,867,756	32,925,019	34,057,539	35,268,088	36,029,497	36,564,020	36,564,622	36,564,020
Income Tax	0	4,507,599	10,620,179	11,153,715	11,523,757	11,920,139	12,343,831	12,610,324	12,797,407	12,797,618	12,797,407
Annual Cash Flow	19,444,812	14,937,214	8,289,508	8,291,098	7,921,056	7,524,674	7,100,982	26,108,607	26,456,649	26,456,438	26,456,649
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	8,246,499	5,758,943	2,905,422	2,641,799	2,294,448	1,981,482	1,699,919	5,681,994	5,234,307	4,758,423	4,325,874
TPI + Interest											
NPV											

Table S17. Discounted cashflow sheet of bioethanol production in USA (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-15,035,074
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Ethanol	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406	76,510,406
Other sales	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331	59,331
Total Annual Sales	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737	76,569,737
Annual Manufacturing Cost											
Raw Material cost	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348	14,624,348
Utility cost	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164	11,356,164
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168	11,335,168
Total Product Cost	37,315,681	37,850,806	37,315,681	37,315,681	37,315,681	37,315,681	37,850,806	37,315,681	37,315,681	37,315,681	37,315,681
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	2,689,434	1,345,018									
Remaining Value	1,345,018	0									
Net Revenue	36,564,622	37,373,912	39,254,056	39,254,056	39,254,056	39,254,056	38,718,931	39,254,056	39,254,056	39,254,056	39,254,056
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	36,564,622	37,373,912	39,254,056	39,254,056	39,254,056	39,254,056	38,718,931	39,254,056	39,254,056	39,254,056	39,254,056
Income Tax	12,797,618	13,080,869	13,738,920	13,738,920	13,738,920	13,738,920	13,551,626	13,738,920	13,738,920	13,738,920	13,738,920
Annual Cash Flow	26,456,438	25,638,061	25,515,137	25,515,137	25,515,137	25,515,137	25,167,305	25,515,137	25,515,137	25,515,137	25,515,137
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	3,932,581	3,464,486	3,134,432	2,849,483	2,590,439	2,354,945	2,111,674	1,946,236	1,769,305	1,608,459	1,462,236
TPI + Interest											-967,545
NPV											

Table S18. Discounted cashflow sheet of bioethanol production in Brazil

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	9,787,220	73,404,151	39,148,881								
Land	1,848,000										
Working Capital			15,292,532								
Loan Payment				20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453
Loan Interest Payment	1,027,658	8,735,094	12,845,727	12,845,727	12,334,536	11,787,561	11,202,299	10,576,068	9,906,001	9,189,030	8,421,870
Loan Principal	14,680,830	124,787,058	183,510,379	176,207,652	168,393,735	160,032,843	151,086,689	141,514,304	131,271,852	120,312,428	108,585,845
Ethanol				67,245,243	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707
Other sales				56,213	64,244	64,244	64,244	64,244	64,244	64,244	64,244
Total Annual Sales				67,301,457	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950
Annual Manufacturing Cost				23,955,425							
Raw Material cost				13,709,042	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978
Utility cost				10,246,383	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				10,740,046	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049
Total Product Cost				35,230,597	37,008,502	37,008,502	37,008,502	37,008,502	37,543,628	37,008,502	37,008,502
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				35,115,896	60,181,126	42,979,497	30,692,620	21,944,363	21,919,789	21,944,363	10,959,895
Remaining Value				210,621,654	150,440,528	107,461,030	76,768,410	54,824,047	32,904,258	10,959,895	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				2,254,241	4,339,563	4,013,750	3,713,185	3,434,260	3,176,976	2,938,327	2,718,314
Remaining Value				57,858,841	53,519,278	49,505,527	45,792,342	42,358,082	39,181,105	36,242,778	33,524,464
Net Revenue				-18,145,003	-36,947,777	-18,873,361	-5,700,656	3,952,756	4,369,555	5,835,728	17,807,370
Losses Forward					-18,145,003	-55,092,780	-73,966,141	-79,666,798	-75,714,041	-71,344,486	-65,508,759
Taxable Income				-18,145,003	-55,092,780	-73,966,141	-79,666,798	-75,714,041	-71,344,486	-65,508,759	-47,701,389
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				11,922,407	19,758,995	19,758,995	19,758,995	19,758,995	19,223,869	19,758,995	19,758,995
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				10,838,552	16,329,748	14,845,225	13,495,659	12,268,781	10,851,373	10,139,489	9,217,717
TPI + Interest	15,322,083	90,353,170	67,287,139								
NPV			0								

Table S18. Discounted cashflow sheet of bioethanol production in Brazil (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	20,148,453	0	0	0	0
Loan Interest Payment	7,601,009	6,722,688	5,782,885	4,777,295	3,701,314	2,550,014	1,318,123	0	0	0	0
Loan Principal	96,038,401	82,612,636	68,247,067	52,875,909	36,428,769	18,830,330	0	0	0	0	0
Ethanol	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707
Other sales	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244
Total Annual Sales	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950
Annual Manufacturing Cost											
Raw Material cost	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978
Utility cost	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049
Total Product Cost	37,008,502	37,008,502	37,543,628	37,008,502	37,008,502	37,008,502	37,008,502	37,543,628	37,008,502	37,008,502	37,008,502
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	2,682,246	2,681,645	2,682,246	2,681,645	2,682,246	2,681,645	2,682,246	2,681,645	2,682,246	2,681,645	2,682,246
Remaining Value	30,842,219	28,160,574	25,478,329	22,796,684	20,114,438	17,432,794	14,750,548	12,068,903	9,386,658	6,705,013	4,022,767
Net Revenue	29,624,193	30,503,115	30,907,192	32,448,509	33,523,889	34,675,789	35,907,079	36,690,678	37,225,202	37,225,803	37,225,202
Losses Forward	-47,701,389	-18,077,196	0	0	0	0	0	0	0	0	0
Taxable Income	-18,077,196	12,425,919	30,907,192	32,448,509	33,523,889	34,675,789	35,907,079	36,690,678	37,225,202	37,225,803	37,225,202
Income Tax	0	4,349,072	10,817,517	11,356,978	11,733,361	12,136,526	12,567,478	12,841,737	13,028,821	13,029,031	13,028,821
Annual Cash Flow	19,758,995	15,409,923	8,406,352	8,402,017	8,025,634	7,622,468	7,191,517	26,530,585	26,878,627	26,878,417	26,878,627
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	8,379,743	5,941,192	2,946,375	2,677,141	2,324,740	2,007,234	1,721,592	5,773,828	5,317,793	4,834,320	4,394,870
TPI + Interest											
NPV											

Table S18. Discounted cashflow sheet of bioethanol production in Brazil (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-15,292,532
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Ethanol	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707	76,851,707
Other sales	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244	64,244
Total Annual Sales	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950	76,915,950
Annual Manufacturing Cost											
Raw Material cost	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978	14,622,978
Utility cost	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475	10,929,475
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049	11,456,049
Total Product Cost	37,008,502	37,543,628	37,008,502	37,008,502	37,008,502	37,008,502	37,543,628	37,008,502	37,008,502	37,008,502	37,008,502
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	2,681,645	1,341,123									
Remaining Value	1,341,123	0									
Net Revenue	37,225,803	38,031,200	39,907,448	39,907,448	39,907,448	39,907,448	39,372,322	39,907,448	39,907,448	39,907,448	39,907,448
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	37,225,803	38,031,200	39,907,448	39,907,448	39,907,448	39,907,448	39,372,322	39,907,448	39,907,448	39,907,448	39,907,448
Income Tax	13,029,031	13,310,920	13,967,607	13,967,607	13,967,607	13,967,607	13,780,313	13,967,607	13,967,607	13,967,607	13,967,607
Annual Cash Flow	26,878,417	26,061,403	25,939,841	25,939,841	25,939,841	25,939,841	25,592,010	25,939,841	25,939,841	25,939,841	25,939,841
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	3,995,305	3,521,692	3,186,605	2,896,914	2,633,558	2,394,144	2,147,309	1,978,631	1,798,755	1,635,232	1,486,575
TPI + Interest											-982,299
NPV											

Table S19. Discounted cashflow sheet of biohydrogen production in China

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,326,347	32,447,605	17,305,389								
Land	1,848,000										
Working Capital			6,759,918								
Loan Payment				8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431
Loan Interest Payment	454,266	3,861,265	5,678,331	5,678,331	5,452,364	5,210,579	4,951,869	4,675,050	4,378,853	4,061,923	3,722,807
Loan Principal	6,489,521	55,160,928	81,119,012	77,890,912	74,436,844	70,740,991	66,786,429	62,555,048	58,027,470	53,182,961	47,999,337
Hydrogen				33,696,798	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626
Other sales				1,590,472	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682
Total Annual Sales				35,287,270	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308
Annual Manufacturing Cost											
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				202,834	216,356	216,356	216,356	216,356	216,356	216,356	216,356
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				7,677,497	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331
Total Product Cost				21,556,082	22,422,353	22,422,353	22,422,353	22,422,353	22,957,479	22,422,353	22,422,353
Annual Depreciation											
<u>General Plant</u>				14.29%	24.49%	17.49%	12.49%	8.93%	8.92%	8.93%	4.46%
Depreciation Charge				16,555,613	28,372,775	20,262,958	14,470,231	10,345,810	10,334,224	10,345,810	5,167,112
Remaining Value				99,298,919	70,926,144	50,663,187	36,192,956	25,847,146	15,512,922	5,167,112	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				725,393	1,396,431	1,291,587	1,194,868	1,105,113	1,022,321	945,526	874,728
Remaining Value				18,618,429	17,221,998	15,930,411	14,735,544	13,630,431	12,608,110	11,662,584	10,787,856
Net Revenue				-9,228,149	-17,315,614	-8,859,169	-2,711,013	1,779,983	1,635,431	2,552,696	8,141,308
Losses Forward					-9,228,149	-26,543,763	-35,402,931	-38,113,944	-36,333,962	-34,698,531	-32,145,834
Taxable Income				-9,228,149	-26,543,763	-35,402,931	-38,113,944	-36,333,962	-34,698,531	-32,145,834	-24,004,526
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				4,824,757	8,999,524	8,999,524	8,999,524	8,999,524	8,464,398	8,999,524	8,999,524
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,386,142	7,437,623	6,761,475	6,146,796	5,587,996	4,777,932	4,618,179	4,198,344
TPI + Interest	8,020,623	39,939,757	29,743,638								
NPV			0								

Table S19. Discounted cashflow sheet of biohydrogen production in China (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	8,906,431	0	0	0	0
Loan Interest Payment	3,359,954	2,971,700	2,556,269	2,111,758	1,636,130	1,127,209	582,664	0	0	0	0
Loan Principal	42,452,859	36,518,128	30,167,965	23,373,291	16,102,990	8,323,768	0	0	0	0	0
Hydrogen	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626
Other sales	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682
Total Annual Sales	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331
Total Product Cost	22,422,353	22,422,353	22,957,479	22,422,353	22,422,353	22,422,353	22,422,353	22,957,479	22,422,353	22,422,353	22,422,353
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	863,121	862,928	863,121	862,928	863,121	862,928	863,121	862,928	863,121	862,928	863,121
Remaining Value	9,924,735	9,061,807	8,198,686	7,335,758	6,472,636	5,609,708	4,746,587	3,883,659	3,020,538	2,157,610	1,294,489
Net Revenue	13,682,880	14,071,327	13,951,439	14,931,270	15,406,703	15,915,818	16,460,170	16,507,902	17,042,834	17,043,027	17,042,834
Losses Forward	-24,004,526	-10,321,646	0	0	0	0	0	0	0	0	0
Taxable Income	-10,321,646	3,749,681	13,951,439	14,931,270	15,406,703	15,915,818	16,460,170	16,507,902	17,042,834	17,043,027	17,042,834
Income Tax	0	1,312,388	4,883,004	5,225,944	5,392,346	5,570,536	5,761,059	5,777,766	5,964,992	5,965,059	5,964,992
Annual Cash Flow	8,999,524	7,687,135	3,581,394	3,773,579	3,607,177	3,428,987	3,238,464	11,593,064	11,940,963	11,940,896	11,940,963
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,816,676	2,963,723	1,255,257	1,202,379	1,044,871	902,960	775,263	2,522,988	2,362,456	2,147,675	1,952,443
TPI + Interest											
NPV											

Table S19. Discounted cashflow sheet of biohydrogen production in China (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-6,759,918
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Hydrogen	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626	38,510,626
Other sales	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682	1,817,682
Total Annual Sales	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308	40,328,308
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356	216,356
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331	8,189,331
Total Product Cost	22,422,353	22,957,479	22,422,353	22,422,353	22,422,353	22,422,353	22,957,479	22,422,353	22,422,353	22,422,353	22,422,353
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	862,928	431,561									
Remaining Value	431,561	0									
Net Revenue	17,043,027	16,939,269	17,905,955	17,905,955	17,905,955	17,905,955	17,370,830	17,905,955	17,905,955	17,905,955	17,905,955
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	17,043,027	16,939,269	17,905,955	17,905,955	17,905,955	17,905,955	17,370,830	17,905,955	17,905,955	17,905,955	17,905,955
Income Tax	5,965,059	5,928,744	6,267,084	6,267,084	6,267,084	6,267,084	6,079,790	6,267,084	6,267,084	6,267,084	6,267,084
Annual Cash Flow	11,940,896	11,442,085	11,638,871	11,638,871	11,638,871	11,638,871	11,291,039	11,638,871	11,638,871	11,638,871	11,638,871
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,774,938	1,546,176	1,429,788	1,299,808	1,181,643	1,074,221	947,380	887,786	807,078	733,708	667,007
TPI + Interest											-493,307
NPV											

Table S20. Discounted cashflow sheet of biohydrogen production in India

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,787,102	35,903,265	19,148,408								
Land	1,848,000										
Working Capital			7,479,847								
Loan Payment				9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964
Loan Interest Payment	502,646	4,272,489	6,283,071	6,283,071	6,033,039	5,765,504	5,479,242	5,172,941	4,845,200	4,494,516	4,119,285
Loan Principal	7,180,653	61,035,550	89,758,162	86,186,269	82,364,345	78,274,885	73,899,163	69,217,141	64,207,377	58,846,930	53,111,251
Hydrogen				35,368,623	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283
Other sales				1,933,514	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731
Total Annual Sales				37,302,137	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014
Annual Manufacturing Cost											
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				349,412	372,706	372,706	372,706	372,706	372,706	372,706	372,706
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				7,960,145	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822
Total Product Cost				21,985,308	22,880,194	22,880,194	22,880,194	22,880,194	23,415,320	22,880,194	22,880,194
Annual Depreciation											
<u>General Plant</u>				14.29%	24.49%	17.49%	12.49%	8.93%	8.92%	8.93%	4.46%
Depreciation Charge				18,354,843	31,456,270	22,465,094	16,042,826	11,470,171	11,457,326	11,470,171	5,728,663
Remaining Value				110,090,522	78,634,252	56,169,158	40,126,332	28,656,161	17,198,834	5,728,663	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				793,184	1,526,932	1,412,290	1,306,533	1,208,389	1,117,861	1,033,889	956,474
Remaining Value				20,358,388	18,831,456	17,419,166	16,112,633	14,904,244	13,786,383	12,752,494	11,796,020
Net Revenue				-10,114,269	-19,265,421	-9,892,069	-3,077,781	1,899,318	1,795,307	2,752,243	8,946,397
Losses Forward					-10,114,269	-29,379,690	-39,271,759	-42,349,541	-40,450,223	-38,654,916	-35,902,673
Taxable Income				-10,114,269	-29,379,690	-39,271,759	-42,349,541	-40,450,223	-38,654,916	-35,902,673	-26,956,276
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				5,461,866	9,895,856	9,895,856	9,895,856	9,895,856	9,360,730	9,895,856	9,895,856
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,965,332	8,178,393	7,434,903	6,759,003	6,144,548	5,283,888	5,078,139	4,616,490
TPI + Interest	8,636,675	44,193,329	32,911,326								
NPV			0								

Table S20. Discounted cashflow sheet of biohydrogen production in India (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	9,854,964	0	0	0	0
Loan Interest Payment	3,717,788	3,288,185	2,828,511	2,336,659	1,810,378	1,247,257	644,717	0	0	0	0
Loan Principal	46,974,075	40,407,297	33,380,844	25,862,539	17,817,953	9,210,246	0	0	0	0	0
Hydrogen	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283
Other sales	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731
Total Annual Sales	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822
Total Product Cost	22,880,194	22,880,194	23,415,320	22,880,194	22,880,194	22,880,194	22,880,194	23,415,320	22,880,194	22,880,194	22,880,194
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	943,783	943,572	943,783	943,572	943,783	943,572	943,783	943,572	943,783	943,572	943,783
Remaining Value	10,852,237	9,908,665	8,964,882	8,021,311	7,077,528	6,133,956	5,190,173	4,246,601	3,302,818	2,359,246	1,415,463
Net Revenue	15,089,249	15,519,062	15,443,400	16,470,589	16,996,658	17,559,991	18,162,319	18,272,122	18,807,036	18,807,248	18,807,036
Losses Forward	-26,956,276	-11,867,028	0	0	0	0	0	0	0	0	0
Taxable Income	-11,867,028	3,652,035	15,443,400	16,470,589	16,996,658	17,559,991	18,162,319	18,272,122	18,807,036	18,807,248	18,807,036
Income Tax	0	1,278,212	5,405,190	5,764,706	5,948,830	6,145,997	6,356,812	6,395,243	6,582,463	6,582,537	6,582,463
Annual Cash Flow	9,895,856	8,617,643	3,955,540	4,131,150	3,947,025	3,749,859	3,539,044	12,820,451	13,168,357	13,168,283	13,168,357
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	4,196,809	3,322,475	1,386,393	1,316,312	1,143,313	987,455	847,219	2,790,104	2,605,289	2,368,431	2,153,132
TPI + Interest											
NPV											

Table S20. Discounted cashflow sheet of biohydrogen production in India (continued)

Year	20	21	22	23	24	25	26	27	28	29	30	
Capital Investment												
Land												-1,848,000
Working Capital												-7,479,847
Loan Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283	40,421,283
Other sales	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731	2,209,731
Total Annual Sales	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014	42,631,014
Annual Manufacturing Cost												
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706	372,706
Baghouse Bags		535,125					535,125					
Fixed Operating Costs	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822	8,490,822
Total Product Cost	22,880,194	23,415,320	22,880,194	22,880,194	22,880,194	22,880,194	23,415,320	22,880,194	22,880,194	22,880,194	22,880,194	22,880,194
Annual Depreciation												
<u>General Plant</u>												
Depreciation Charge												
Remaining Value												
<u>Heat and Power Plant</u>	4.46%	2.23%										
Depreciation Charge	943,572	471,892										
Remaining Value	471,892	0										
Net Revenue	18,807,248	18,743,802	19,750,819	19,750,819	19,750,819	19,750,819	19,215,694	19,750,819	19,750,819	19,750,819	19,750,819	19,750,819
Losses Forward	0	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	18,807,248	18,743,802	19,750,819	19,750,819	19,750,819	19,750,819	19,215,694	19,750,819	19,750,819	19,750,819	19,750,819	19,750,819
Income Tax	6,582,537	6,560,331	6,912,787	6,912,787	6,912,787	6,912,787	6,725,493	6,912,787	6,912,787	6,912,787	6,912,787	6,912,787
Annual Cash Flow	13,168,283	12,655,363	12,838,033	12,838,033	12,838,033	12,838,033	12,490,201	12,838,033	12,838,033	12,838,033	12,838,033	12,838,033
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.06
Annual Present Value	1,957,381	1,710,126	1,577,101	1,433,728	1,303,389	1,184,899	1,047,996	979,255	890,232	809,302	735,729	735,729
TPI + Interest												-534,565
NPV												

Table S21. Discounted cashflow sheet of biohydrogen production in USA

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	5,248,019	39,360,143	20,992,076								
Land	1,848,000										
Working Capital			8,200,030								
Loan Payment				10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830
Loan Interest Payment	551,042	4,683,857	6,888,025	6,888,025	6,613,919	6,320,625	6,006,801	5,671,008	5,311,711	4,927,262	4,515,903
Loan Principal	7,872,029	66,912,244	98,400,358	94,484,553	90,294,641	85,811,436	81,014,406	75,881,584	70,389,464	64,512,896	58,224,969
Hydrogen				37,009,221	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253
Other sales				2,333,317	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648
Total Annual Sales				39,342,538	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900
Annual Manufacturing Cost											
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				521,993	556,792	556,792	556,792	556,792	556,792	556,792	556,792
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				8,243,493	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059
Total Product Cost				22,441,236	23,366,518	23,366,518	23,366,518	23,366,518	23,901,644	23,366,518	23,366,518
Annual Depreciation											
<u>General Plant</u>				14.29%	24.49%	17.49%	12.49%	8.93%	8.92%	8.93%	4.46%
Depreciation Charge				20,160,625	34,550,994	24,675,251	17,621,148	12,598,627	12,584,519	12,598,627	6,292,259
Remaining Value				120,921,426	86,370,431	61,695,181	44,074,033	31,475,406	18,890,887	6,292,259	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				859,445	1,654,490	1,530,271	1,415,679	1,309,337	1,211,245	1,120,259	1,036,377
Remaining Value				22,059,101	20,404,611	18,874,340	17,458,661	16,149,325	14,938,079	13,817,821	12,781,444
Net Revenue				-11,006,794	-21,223,021	-10,929,765	-3,447,245	2,017,410	1,953,782	2,950,234	9,751,843
Losses Forward					-11,006,794	-32,229,814	-43,159,579	-46,606,824	-44,589,414	-42,635,632	-39,685,398
Taxable Income				-11,006,794	-32,229,814	-43,159,579	-46,606,824	-44,589,414	-42,635,632	-39,685,398	-29,933,555
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				6,097,471	10,792,552	10,792,552	10,792,552	10,792,552	10,257,426	10,792,552	10,792,552
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				5,543,156	8,919,464	8,108,604	7,371,458	6,701,326	5,790,050	5,538,286	5,034,805
TPI + Interest	9,252,944	48,448,400	36,080,131								
NPV			0								

Table S21. Discounted cashflow sheet of biohydrogen production in USA (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	10,803,830	0	0	0	0
Loan Interest Payment	4,075,748	3,604,782	3,100,849	2,561,640	1,984,687	1,367,347	706,793	0	0	0	0
Loan Principal	51,496,886	44,297,838	36,594,856	28,352,665	19,533,522	10,097,038	0	0	0	0	0
Hydrogen	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253
Other sales	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648
Total Annual Sales	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059
Total Product Cost	23,366,518	23,366,518	23,901,644	23,366,518	23,366,518	23,366,518	23,366,518	23,901,644	23,366,518	23,366,518	23,366,518
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	1,022,626	1,022,396	1,022,626	1,022,396	1,022,626	1,022,396	1,022,626	1,022,396	1,022,626	1,022,396	1,022,626
Remaining Value	11,758,819	10,736,422	9,713,797	8,691,400	7,668,775	6,646,378	5,623,753	4,601,357	3,578,731	2,556,335	1,533,709
Net Revenue	16,498,009	16,969,204	16,937,783	18,012,346	18,589,070	19,206,639	19,866,964	20,038,860	20,573,757	20,573,986	20,573,757
Losses Forward	-29,933,555	-13,435,546	0	0	0	0	0	0	0	0	0
Taxable Income	-13,435,546	3,533,658	16,937,783	18,012,346	18,589,070	19,206,639	19,866,964	20,038,860	20,573,757	20,573,986	20,573,757
Income Tax	0	1,236,780	5,928,224	6,304,321	6,506,175	6,722,324	6,953,437	7,013,601	7,200,815	7,200,895	7,200,815
Annual Cash Flow	10,792,552	9,555,771	4,329,202	4,488,231	4,286,377	4,070,228	3,839,114	14,047,656	14,395,567	14,395,487	14,395,567
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	4,577,096	3,684,164	1,517,359	1,430,089	1,241,611	1,071,818	919,053	3,057,179	2,848,086	2,589,155	2,353,790
TPI + Interest											
NPV											

Table S21. Discounted cashflow sheet of biohydrogen production in USA (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-8,200,030
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Hydrogen	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253	42,296,253
Other sales	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648	2,666,648
Total Annual Sales	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900	44,962,900
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792	556,792
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059	8,793,059
Total Product Cost	23,366,518	23,901,644	23,366,518	23,366,518	23,366,518	23,366,518	23,901,644	23,366,518	23,366,518	23,366,518	23,366,518
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	1,022,396	511,313									
Remaining Value	511,313	0									
Net Revenue	20,573,986	20,549,944	21,596,382	21,596,382	21,596,382	21,596,382	21,061,257	21,596,382	21,596,382	21,596,382	21,596,382
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	20,573,986	20,549,944	21,596,382	21,596,382	21,596,382	21,596,382	21,061,257	21,596,382	21,596,382	21,596,382	21,596,382
Income Tax	7,200,895	7,192,480	7,558,734	7,558,734	7,558,734	7,558,734	7,371,440	7,558,734	7,558,734	7,558,734	7,558,734
Annual Cash Flow	14,395,487	13,868,776	14,037,648	14,037,648	14,037,648	14,037,648	13,689,817	14,037,648	14,037,648	14,037,648	14,037,648
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	2,139,797	1,874,096	1,724,469	1,567,699	1,425,181	1,295,619	1,148,650	1,070,759	973,418	884,925	804,477
TPI + Interest											-575,838
NPV											

Table S22. Discounted cashflow sheet of biohydrogen production in Brazil

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	5,409,415	40,570,612	21,637,660								
Land	1,848,000										
Working Capital			8,452,211								
Loan Payment				11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088
Loan Interest Payment	567,989	4,827,903	7,099,857	7,099,857	6,817,321	6,515,007	6,191,532	5,845,413	5,475,065	5,078,794	4,654,783
Loan Principal	8,114,122	68,970,040	101,426,529	97,390,299	93,071,532	88,450,451	83,505,895	78,215,220	72,554,198	66,496,904	60,015,600
Hydrogen				37,695,198	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226
Other sales				2,511,558	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352
Total Annual Sales				40,206,756	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578
Annual Manufacturing Cost											
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				733,671	782,583	782,583	782,583	782,583	782,583	782,583	782,583
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				8,353,187	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066
Total Product Cost				22,762,608	23,709,315	23,709,315	23,709,315	23,709,315	24,244,441	23,709,315	23,709,315
Annual Depreciation											
<u>General Plant</u>				14.29%	24.49%	17.49%	12.49%	8.93%	8.92%	8.93%	4.46%
Depreciation Charge				20,893,312	35,806,663	25,572,010	18,261,544	13,056,492	13,041,872	13,056,492	6,520,936
Remaining Value				125,316,010	89,509,347	63,937,337	45,675,792	32,619,300	19,577,428	6,520,936	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				856,308	1,648,451	1,524,686	1,410,511	1,304,557	1,206,824	1,116,170	1,032,594
Remaining Value				21,978,585	20,330,134	18,805,448	17,394,937	16,090,379	14,883,555	13,767,386	12,734,792
Net Revenue				-11,405,330	-22,031,172	-11,370,440	-3,622,324	2,034,801	1,982,377	2,989,807	10,032,950
Losses Forward					-11,405,330	-33,436,502	-44,806,942	-48,429,266	-46,394,466	-44,412,089	-41,422,282
Taxable Income				-11,405,330	-33,436,502	-44,806,942	-48,429,266	-46,394,466	-44,412,089	-41,422,282	-31,389,332
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				6,308,060	11,105,175	11,105,175	11,105,175	11,105,175	10,570,050	11,105,175	11,105,175
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				5,734,600	9,177,831	8,343,483	7,584,984	6,895,440	5,966,518	5,698,711	5,180,646
TPI + Interest	9,468,738	49,938,366	37,189,727								
NPV			0								

Table S22. Discounted cashflow sheet of biohydrogen production in Brazil (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	11,136,088	0	0	0	0
Loan Interest Payment	4,201,092	3,715,642	3,196,211	2,640,420	2,045,723	1,409,397	728,529	0	0	0	0
Loan Principal	53,080,604	45,660,158	37,720,282	29,224,614	20,134,249	10,407,559	0	0	0	0	0
Hydrogen	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226
Other sales	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352
Total Annual Sales	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066
Total Product Cost	23,709,315	23,709,315	24,244,441	23,709,315	23,709,315	23,709,315	23,709,315	24,244,441	23,709,315	23,709,315	23,709,315
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	1,018,893	1,018,665	1,018,893	1,018,665	1,018,893	1,018,665	1,018,893	1,018,665	1,018,893	1,018,665	1,018,893
Remaining Value	11,715,899	10,697,234	9,678,341	8,659,677	7,640,784	6,622,119	5,603,226	4,584,562	3,565,669	2,547,004	1,528,111
Net Revenue	17,021,278	17,506,956	17,491,034	18,582,179	19,176,647	19,813,201	20,493,841	20,687,473	21,222,370	21,222,599	21,222,370
Losses Forward	-31,389,332	-14,368,053	0	0	0	0	0	0	0	0	0
Taxable Income	-14,368,053	3,138,903	17,491,034	18,582,179	19,176,647	19,813,201	20,493,841	20,687,473	21,222,370	21,222,599	21,222,370
Income Tax	0	1,098,616	6,121,862	6,503,763	6,711,827	6,934,620	7,172,844	7,240,616	7,427,830	7,427,910	7,427,830
Annual Cash Flow	11,105,175	10,006,559	4,448,188	4,601,413	4,393,349	4,170,555	3,932,331	14,465,522	14,813,434	14,813,354	14,813,434
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	4,709,678	3,857,962	1,559,063	1,466,152	1,272,597	1,098,237	941,369	3,148,119	2,930,759	2,664,312	2,422,115
TPI + Interest											
NPV											

Table S22. Discounted cashflow sheet of biohydrogen production in Brazil (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-8,452,211
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Hydrogen	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226	43,080,226
Other sales	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352	2,870,352
Total Annual Sales	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578	45,950,578
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583	782,583
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066	8,910,066
Total Product Cost	23,709,315	24,244,441	23,709,315	23,709,315	23,709,315	23,709,315	24,244,441	23,709,315	23,709,315	23,709,315	23,709,315
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	1,018,665	509,446									
Remaining Value	509,446	0									
Net Revenue	21,222,599	21,196,691	22,241,263	22,241,263	22,241,263	22,241,263	21,706,138	22,241,263	22,241,263	22,241,263	22,241,263
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	21,222,599	21,196,691	22,241,263	22,241,263	22,241,263	22,241,263	21,706,138	22,241,263	22,241,263	22,241,263	22,241,263
Income Tax	7,427,910	7,418,842	7,784,442	7,784,442	7,784,442	7,784,442	7,597,148	7,784,442	7,784,442	7,784,442	7,784,442
Annual Cash Flow	14,813,354	14,287,296	14,456,821	14,456,821	14,456,821	14,456,821	14,108,990	14,456,821	14,456,821	14,456,821	14,456,821
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	2,201,911	1,930,650	1,775,962	1,614,511	1,467,737	1,334,307	1,183,821	1,102,733	1,002,484	911,349	828,500
TPI + Interest											-590,290
NPV											

Table S23. Discounted cashflow sheet of bioelectricity production in China

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	3,525,434	26,440,757	14,101,737								
Land	1,848,000										
Working Capital			5,508,491								
Loan Payment				7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632
Loan Interest Payment	370,171	3,146,450	4,627,132	4,627,132	4,442,997	4,245,973	4,035,157	3,809,584	3,568,220	3,309,961	3,033,624
Loan Principal	5,288,151	44,949,286	66,101,891	63,471,391	60,656,756	57,645,097	54,422,621	50,974,573	47,285,160	43,337,489	39,113,481
Electricity				30,520,442	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505
Other sales				1,546,439	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales				32,066,882	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865
Annual Manufacturing Cost				13,443,389							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				302,764	322,948	322,948	322,948	322,948	322,948	322,948	322,948
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				7,115,286	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639
Total Product Cost				21,093,801	21,929,254	21,929,254	21,929,254	21,929,254	22,464,379	21,929,254	21,929,254
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				12,754,125	21,857,840	15,610,193	11,147,588	7,970,213	7,961,288	7,970,213	3,980,644
Remaining Value				76,497,977	54,640,137	39,029,944	27,882,357	19,912,144	11,950,857	3,980,644	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				784,414	1,510,050	1,396,676	1,292,087	1,195,029	1,105,501	1,022,458	945,899
Remaining Value				20,133,302	18,623,252	17,226,576	15,934,489	14,739,460	13,633,958	12,611,500	11,665,601
Net Revenue				-7,192,591	-13,092,276	-6,534,230	-1,756,221	1,743,786	1,548,477	2,415,979	6,758,444
Losses Forward					-7,192,591	-20,284,867	-26,819,098	-28,575,318	-26,831,532	-25,283,056	-22,867,076
Taxable Income				-7,192,591	-20,284,867	-26,819,098	-28,575,318	-26,831,532	-25,283,056	-22,867,076	-16,108,632
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				3,715,449	7,460,979	7,460,979	7,460,979	7,460,979	6,925,853	7,460,979	7,460,979
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				3,377,681	6,166,098	5,605,544	5,095,949	4,632,681	3,909,464	3,828,662	3,480,602
TPI + Interest	6,949,762	32,545,927	24,237,360								
NPV			0								

Table S23. Discounted cashflow sheet of bioelectricity production in China (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	7,257,632	0	0	0	0
Loan Interest Payment	2,737,944	2,421,565	2,083,041	1,720,819	1,333,242	918,535	474,798	0	0	0	0
Loan Principal	34,593,792	29,757,726	24,583,134	19,046,321	13,121,931	6,782,834	0	0	0	0	0
Electricity	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639
Total Product Cost	21,929,254	21,929,254	22,464,379	21,929,254	21,929,254	21,929,254	21,929,254	22,464,379	21,929,254	21,929,254	21,929,254
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	933,349	933,139	933,349	933,139	933,349	933,139	933,349	933,139	933,349	933,139	933,349
Remaining Value	10,732,253	9,799,113	8,865,765	7,932,626	6,999,277	6,066,138	5,132,789	4,199,650	3,266,301	2,333,162	1,399,814
Net Revenue	11,047,319	11,363,906	11,167,096	12,064,652	12,452,020	12,866,937	13,310,464	13,250,346	13,785,263	13,785,472	13,785,263
Losses Forward	-16,108,632	-5,061,313	0	0	0	0	0	0	0	0	0
Taxable Income	-5,061,313	6,302,593	11,167,096	12,064,652	12,452,020	12,866,937	13,310,464	13,250,346	13,785,263	13,785,472	13,785,263
Income Tax	0	2,205,908	3,908,484	4,222,628	4,358,207	4,503,428	4,658,663	4,637,621	4,824,842	4,824,915	4,824,842
Annual Cash Flow	7,460,979	5,255,071	3,017,370	3,238,350	3,102,772	2,957,551	2,802,316	9,545,865	9,893,769	9,893,696	9,893,769
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,164,183	2,026,057	1,057,570	1,031,838	898,762	778,816	670,852	2,077,458	1,957,430	1,779,468	1,617,710
TPI + Interest											
NPV											

Table S23. Discounted cashflow sheet of bioelectricity production in China (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-5,508,491
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Electricity	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505	34,880,505
Other sales	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359	1,767,359
Total Annual Sales	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865	36,647,865
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948	322,948
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639	7,589,639
Total Product Cost	21,929,254	22,464,379	21,929,254	21,929,254	21,929,254	21,929,254	22,464,379	21,929,254	21,929,254	21,929,254	21,929,254
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	933,139	466,674									
Remaining Value	466,674	0									
Net Revenue	13,785,472	13,716,812	14,718,611	14,718,611	14,718,611	14,718,611	14,183,486	14,718,611	14,718,611	14,718,611	14,718,611
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	13,785,472	13,716,812	14,718,611	14,718,611	14,718,611	14,718,611	14,183,486	14,718,611	14,718,611	14,718,611	14,718,611
Income Tax	4,824,915	4,800,884	5,151,514	5,151,514	5,151,514	5,151,514	4,964,220	5,151,514	5,151,514	5,151,514	5,151,514
Annual Cash Flow	9,893,696	9,382,602	9,567,097	9,567,097	9,567,097	9,567,097	9,219,266	9,567,097	9,567,097	9,567,097	9,567,097
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,470,635	1,267,876	1,175,279	1,068,436	971,305	883,005	773,547	729,756	663,415	603,104	548,277
TPI + Interest											-421,590
NPV											

Table S24. Discounted cashflow sheet of bioelectricity production in India

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,098,693	30,740,200	16,394,773								
Land	1,848,000										
Working Capital			6,404,208								
Loan Payment				8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772
Loan Interest Payment	430,363	3,658,084	5,379,535	5,379,535	5,165,458	4,936,396	4,691,300	4,429,047	4,148,436	3,848,183	3,526,912
Loan Principal	6,148,040	52,258,340	76,850,500	73,792,263	70,519,950	67,018,574	63,272,103	59,263,378	54,974,043	50,384,454	45,473,594
Electricity				32,584,008	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867
Other sales				1,878,355	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales				34,462,363	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558
Annual Manufacturing Cost				13,525,434							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				384,809	410,463	410,463	410,463	410,463	410,463	410,463	410,463
Baghouse Bags				535,125					535,125		
Fixed Operating Costs				7,443,319	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540
Total Product Cost				21,503,878	22,366,670	22,366,670	22,366,670	22,366,670	22,901,795	22,366,670	22,366,670
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				14,764,548	25,303,274	18,070,815	12,904,773	9,226,551	9,216,219	9,226,551	4,608,109
Remaining Value				88,556,292	63,253,018	45,182,203	32,277,430	23,050,879	13,834,660	4,608,109	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				928,625	1,787,665	1,653,447	1,529,631	1,414,729	1,308,742	1,210,431	1,119,798
Remaining Value				23,834,702	22,047,037	20,393,590	18,863,959	17,449,230	16,140,488	14,930,057	13,810,259
Net Revenue				-8,114,223	-15,237,508	-7,641,770	-2,106,815	1,948,561	1,810,366	2,733,723	7,764,070
Losses Forward					-8,114,223	-23,351,731	-30,993,501	-33,100,317	-31,151,755	-29,341,390	-26,607,667
Taxable Income				-8,114,223	-23,351,731	-30,993,501	-33,100,317	-31,151,755	-29,341,390	-26,607,667	-18,843,597
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				4,520,713	8,581,117	8,581,117	8,581,117	8,581,117	8,045,991	8,581,117	8,581,117
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,109,739	7,091,832	6,447,120	5,861,018	5,328,198	4,541,752	4,403,470	4,003,154
TPI + Interest	7,716,238	37,838,112	28,178,517								
NPV			0								

Table S24. Discounted cashflow sheet of bioelectricity production in India (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	8,437,772	0	0	0	0
Loan Interest Payment	3,183,152	2,815,328	2,421,757	2,000,636	1,550,037	1,067,895	552,004	0	0	0	0
Loan Principal	40,218,974	34,596,530	28,580,516	22,143,380	15,255,645	7,885,768	0	0	0	0	0
Electricity	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867
Other sales	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540
Total Product Cost	22,366,670	22,366,670	22,901,795	22,366,670	22,366,670	22,366,670	22,366,670	22,901,795	22,366,670	22,366,670	22,366,670
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	1,104,940	1,104,692	1,104,940	1,104,692	1,104,940	1,104,692	1,104,940	1,104,692	1,104,940	1,104,692	1,104,940
Remaining Value	12,705,320	11,600,628	10,495,688	9,390,996	8,286,057	7,181,365	6,076,425	4,971,733	3,866,793	2,762,101	1,657,162
Net Revenue	12,730,797	13,098,868	12,957,066	13,913,560	14,363,912	14,846,301	15,361,945	15,379,071	15,913,949	15,914,196	15,913,949
Losses Forward	-18,843,597	-6,112,800	0	0	0	0	0	0	0	0	0
Taxable Income	-6,112,800	6,986,068	12,957,066	13,913,560	14,363,912	14,846,301	15,361,945	15,379,071	15,913,949	15,914,196	15,913,949
Income Tax	0	2,445,124	4,534,973	4,869,746	5,027,369	5,196,205	5,376,681	5,382,675	5,569,882	5,569,969	5,569,882
Annual Cash Flow	8,581,117	6,135,993	3,511,018	3,711,370	3,553,747	3,384,911	3,204,436	11,101,088	11,449,006	11,448,920	11,449,006
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,639,231	2,365,691	1,230,590	1,182,557	1,029,394	891,353	767,116	2,415,920	2,265,125	2,059,189	1,872,004
TPI + Interest											
NPV											

Table S24. Discounted cashflow sheet of bioelectricity production in India (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-6,404,208
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Electricity	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867	37,238,867
Other sales	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691	2,146,691
Total Annual Sales	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558	39,385,558
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463	410,463
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540	7,939,540
Total Product Cost	22,366,670	22,901,795	22,366,670	22,366,670	22,366,670	22,366,670	22,901,795	22,366,670	22,366,670	22,366,670	22,366,670
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	1,104,692	552,470									
Remaining Value	552,470	0									
Net Revenue	15,914,196	15,931,293	17,018,888	17,018,888	17,018,888	17,018,888	16,483,763	17,018,888	17,018,888	17,018,888	17,018,888
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	15,914,196	15,931,293	17,018,888	17,018,888	17,018,888	17,018,888	16,483,763	17,018,888	17,018,888	17,018,888	17,018,888
Income Tax	5,569,969	5,575,953	5,956,611	5,956,611	5,956,611	5,956,611	5,769,317	5,956,611	5,956,611	5,956,611	5,956,611
Annual Cash Flow	11,448,920	10,907,810	11,062,277	11,062,277	11,062,277	11,062,277	10,714,446	11,062,277	11,062,277	11,062,277	11,062,277
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,701,809	1,473,979	1,358,956	1,235,415	1,123,104	1,021,004	899,000	843,805	767,095	697,359	633,963
TPI + Interest											-472,922
NPV											

Table S25. Discounted cashflow sheet of bioelectricity production in USA

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,434,517	33,258,876	17,738,067								
Land	1,848,000										
Working Capital			6,928,933								
Loan Payment				9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115
Loan Interest Payment	465,624	3,957,806	5,820,303	5,820,303	5,588,687	5,340,857	5,075,679	4,791,938	4,488,336	4,163,481	3,815,887
Loan Principal	6,651,775	56,540,090	83,147,191	79,838,380	76,297,952	72,509,694	68,456,258	64,119,081	59,478,302	54,512,669	49,199,441
Electricity				33,591,165	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903
Other sales				2,290,488	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales				35,881,653	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603
Annual Manufacturing Cost				13,580,549							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				439,924	469,252	469,252	469,252	469,252	469,252	469,252	469,252
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				7,648,395	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288
Total Product Cost				21,764,069	22,644,207	22,644,207	22,644,207	22,644,207	23,179,332	22,644,207	22,644,207
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				16,065,597	27,532,993	19,663,211	14,041,939	10,039,593	10,028,350	10,039,593	5,014,175
Remaining Value				96,359,853	68,826,861	49,163,649	35,121,711	25,082,118	15,053,768	5,014,175	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				980,745	1,888,000	1,746,249	1,615,483	1,494,132	1,382,197	1,278,369	1,182,648
Remaining Value				25,172,457	23,284,457	21,538,208	19,922,725	18,428,592	17,046,395	15,768,027	14,585,379
Net Revenue				-8,749,062	-16,646,283	-8,386,921	-2,369,704	2,037,733	1,929,388	2,881,954	8,350,687
Losses Forward					-8,749,062	-25,395,344	-33,782,265	-36,151,969	-34,114,236	-32,184,848	-29,302,894
Taxable Income				-8,749,062	-25,395,344	-33,782,265	-36,151,969	-34,114,236	-32,184,848	-29,302,894	-20,952,207
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				4,988,469	9,234,282	9,234,282	9,234,282	9,234,282	8,699,156	9,234,282	9,234,282
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,534,972	7,631,638	6,937,853	6,307,139	5,733,762	4,910,447	4,738,647	4,307,861
TPI + Interest	8,165,251	40,938,351	30,487,303								
NPV			0								

Table S25. Discounted cashflow sheet of bioelectricity production in USA (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	9,129,115	0	0	0	0
Loan Interest Payment	3,443,961	3,046,000	2,620,182	2,164,557	1,677,038	1,155,392	597,232	0	0	0	0
Loan Principal	43,514,287	37,431,172	30,922,240	23,957,682	16,505,605	8,531,883	0	0	0	0	0
Electricity	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903
Other sales	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288
Total Product Cost	22,644,207	22,644,207	23,179,332	22,644,207	22,644,207	22,644,207	22,644,207	23,179,332	22,644,207	22,644,207	22,644,207
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	1,166,956	1,166,694	1,166,956	1,166,694	1,166,956	1,166,694	1,166,956	1,166,694	1,166,956	1,166,694	1,166,956
Remaining Value	13,418,423	12,251,729	11,084,773	9,918,079	8,751,123	7,584,429	6,417,473	5,250,778	4,083,822	2,917,128	1,750,172
Net Revenue	13,752,480	14,150,702	14,041,133	15,032,145	15,519,403	16,041,310	16,599,209	16,661,577	17,196,440	17,196,702	17,196,440
Losses Forward	-20,952,207	-7,199,728	0	0	0	0	0	0	0	0	0
Taxable Income	-7,199,728	6,950,974	14,041,133	15,032,145	15,519,403	16,041,310	16,599,209	16,661,577	17,196,440	17,196,702	17,196,440
Income Tax	0	2,432,841	4,914,397	5,261,251	5,431,791	5,614,458	5,809,723	5,831,552	6,018,754	6,018,846	6,018,754
Annual Cash Flow	9,234,282	6,801,441	3,784,760	3,973,031	3,802,491	3,619,823	3,424,559	11,996,719	12,344,642	12,344,551	12,344,642
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	3,916,237	2,622,250	1,326,535	1,265,930	1,101,446	953,213	819,812	2,610,836	2,442,322	2,220,276	2,018,448
TPI + Interest											
NPV											

Table S25. Discounted cashflow sheet of bioelectricity production in USA (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-6,928,933
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Electricity	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903	38,389,903
Other sales	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701	2,617,701
Total Annual Sales	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603	41,007,603
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252	469,252
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288	8,158,288
Total Product Cost	22,644,207	23,179,332	22,644,207	22,644,207	22,644,207	22,644,207	23,179,332	22,644,207	22,644,207	22,644,207	22,644,207
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	1,166,694	583,478									
Remaining Value	583,478	0									
Net Revenue	17,196,702	17,244,793	18,363,396	18,363,396	18,363,396	18,363,396	17,828,271	18,363,396	18,363,396	18,363,396	18,363,396
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	17,196,702	17,244,793	18,363,396	18,363,396	18,363,396	18,363,396	17,828,271	18,363,396	18,363,396	18,363,396	18,363,396
Income Tax	6,018,846	6,035,678	6,427,189	6,427,189	6,427,189	6,427,189	6,239,895	6,427,189	6,427,189	6,427,189	6,427,189
Annual Cash Flow	12,344,551	11,792,593	11,936,208	11,936,208	11,936,208	11,936,208	11,588,376	11,936,208	11,936,208	11,936,208	11,936,208
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,834,939	1,593,540	1,466,315	1,333,014	1,211,831	1,101,664	972,328	910,466	827,697	752,451	684,047
TPI + Interest											-502,993
NPV											

Table S26. Discounted cashflow sheet of bioelectricity production in Brazil

Year	-2	-1	0	1	2	3	4	5	6	7	8
Capital Investment	4,738,092	35,535,690	18,952,368								
Land	1,848,000										
Working Capital			7,403,269								
Loan Payment				9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069
Loan Interest Payment	497,500	4,228,747	6,218,746	6,218,746	5,971,273	5,706,477	5,423,146	5,119,981	4,795,595	4,448,502	4,077,112
Loan Principal	7,107,138	60,410,673	88,839,225	85,303,902	81,521,105	77,473,513	73,142,590	68,508,502	63,550,028	58,244,460	52,567,503
Electricity				34,714,870	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138
Other sales				2,469,219	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales				37,184,089	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102
Annual Manufacturing Cost				13,637,526							
Raw Material cost				13,140,625	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost				496,901	530,028	530,028	530,028	530,028	530,028	530,028	530,028
Baghouse Bags				535,125				535,125			
Fixed Operating Costs				7,851,520	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955
Total Product Cost				22,024,171	22,921,649	22,921,649	22,921,649	22,921,649	23,456,774	22,921,649	22,921,649
Annual Depreciation											
<u>General Plant</u>				14%	24%	17%	12%	9%	9%	9%	4%
Depreciation Charge				17,417,410	29,849,711	21,317,740	15,223,475	10,884,358	10,872,169	10,884,358	5,436,085
Remaining Value				104,467,896	74,618,184	53,300,444	38,076,970	27,192,612	16,320,442	5,436,085	0
<u>Heat and Power Plant</u>				3.75%	7.22%	6.68%	6.18%	5.71%	5.29%	4.89%	4.52%
Depreciation Charge				981,753	1,889,939	1,748,043	1,617,143	1,495,667	1,383,617	1,279,682	1,183,863
Remaining Value				25,198,317	23,308,378	21,560,335	19,943,192	18,447,524	17,063,908	15,784,226	14,600,363
Net Revenue				-9,457,991	-18,136,471	-9,197,808	-2,689,310	2,074,447	1,987,947	2,961,912	8,877,393
Losses Forward					-9,457,991	-27,594,461	-36,792,269	-39,481,579	-37,407,133	-35,419,186	-32,457,275
Taxable Income				-9,457,991	-27,594,461	-36,792,269	-39,481,579	-37,407,133	-35,419,186	-32,457,275	-23,579,881
Income Tax				0	0	0	0	0	0	0	0
Annual Cash Flow				5,405,849	9,820,384	9,820,384	9,820,384	9,820,384	9,285,258	9,820,384	9,820,384
Discount Factor	1.21	1.10	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51	0.47
Annual Present Value				4,914,408	8,116,020	7,378,200	6,707,454	6,097,686	5,241,286	5,039,410	4,581,281
TPI + Interest	8,571,146	43,740,881	32,574,383								
NPV			0								

Table S26. Discounted cashflow sheet of bioelectricity production in Brazil (continued)

Year	9	10	11	12	13	14	15	16	17	18	19
Capital Investment											
Land											
Working Capital											
Loan Payment	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	9,754,069	0	0	0	0
Loan Interest Payment	3,679,725	3,254,521	2,799,553	2,312,737	1,791,843	1,234,487	638,117	0	0	0	0
Loan Principal	46,493,159	39,993,610	33,039,094	25,597,761	17,635,535	9,115,953	0	0	0	0	0
Electricity	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138
Other sales	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028
Baghouse Bags			535,125					535,125			
Fixed Operating Costs	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955
Total Product Cost	22,921,649	22,921,649	23,456,774	22,921,649	22,921,649	22,921,649	22,921,649	23,456,774	22,921,649	22,921,649	22,921,649
Annual Depreciation											
General Plant											
Depreciation Charge											
Remaining Value											
Heat and Power Plant	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%	4.46%
Depreciation Charge	1,168,155	1,167,893	1,168,155	1,167,893	1,168,155	1,167,893	1,168,155	1,167,893	1,168,155	1,167,893	1,168,155
Remaining Value	13,432,208	12,264,316	11,096,161	9,928,268	8,760,113	7,592,220	6,424,066	5,256,173	4,088,018	2,920,125	1,751,970
Net Revenue	14,726,573	15,152,039	15,071,620	16,093,824	16,614,455	17,172,073	17,768,182	17,871,435	18,406,298	18,406,560	18,406,298
Losses Forward	-23,579,881	-8,853,308	0	0	0	0	0	0	0	0	0
Taxable Income	-8,853,308	6,298,731	15,071,620	16,093,824	16,614,455	17,172,073	17,768,182	17,871,435	18,406,298	18,406,560	18,406,298
Income Tax	0	2,204,556	5,275,067	5,632,838	5,815,059	6,010,225	6,218,864	6,255,002	6,442,204	6,442,296	6,442,204
Annual Cash Flow	9,820,384	7,615,828	4,010,191	4,187,545	4,005,324	3,810,158	3,601,520	12,784,326	13,132,249	13,132,157	13,132,249
Discount Factor	0.42	0.39	0.35	0.32	0.29	0.26	0.24	0.22	0.20	0.18	0.16
Annual Present Value	4,164,801	2,936,231	1,405,548	1,334,281	1,160,200	1,003,334	862,175	2,782,242	2,598,145	2,361,934	2,147,228
TPI + Interest											
NPV											

Table S26. Discounted cashflow sheet of bioelectricity production in Brazil (continued)

Year	20	21	22	23	24	25	26	27	28	29	30
Capital Investment											
Land											-1,848,000
Working Capital											-7,403,269
Loan Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Interest Payment	0	0	0	0	0	0	0	0	0	0	0
Loan Principal	0	0	0	0	0	0	0	0	0	0	0
Electricity	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138	39,674,138
Other sales	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964	2,821,964
Total Annual Sales	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102	42,496,102
Annual Manufacturing Cost											
Raw Material cost	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667	14,016,667
Utility cost	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028	530,028
Baghouse Bags		535,125					535,125				
Fixed Operating Costs	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955	8,374,955
Total Product Cost	22,921,649	23,456,774	22,921,649	22,921,649	22,921,649	22,921,649	23,456,774	22,921,649	22,921,649	22,921,649	22,921,649
Annual Depreciation											
<u>General Plant</u>											
Depreciation Charge											
Remaining Value											
<u>Heat and Power Plant</u>	4.46%	2.23%									
Depreciation Charge	1,167,893	584,077									
Remaining Value	584,077	0									
Net Revenue	18,406,560	18,455,250	19,574,453	19,574,453	19,574,453	19,574,453	19,039,328	19,574,453	19,574,453	19,574,453	19,574,453
Losses Forward	0	0	0	0	0	0	0	0	0	0	0
Taxable Income	18,406,560	18,455,250	19,574,453	19,574,453	19,574,453	19,574,453	19,039,328	19,574,453	19,574,453	19,574,453	19,574,453
Income Tax	6,442,296	6,459,338	6,851,059	6,851,059	6,851,059	6,851,059	6,663,765	6,851,059	6,851,059	6,851,059	6,851,059
Annual Cash Flow	13,132,157	12,579,990	12,723,395	12,723,395	12,723,395	12,723,395	12,375,563	12,723,395	12,723,395	12,723,395	12,723,395
Discount Factor	0.15	0.14	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.06
Annual Present Value	1,952,011	1,699,941	1,563,018	1,420,925	1,291,750	1,174,318	1,038,377	970,511	882,283	802,075	729,159
TPI + Interest											-530,177
NPV											

Table S27. Economic assumptions and parameters for economic analysis

Economic assumptions ^a		Unit
Cost year basis	2018	USD
Annual operating time	8,410	h
Equipment lifespan	30	y
Construction time	3	y
Loan terms	15	y
Depreciation period	7	y
Working capital	5.0	%*
Equity	40.0	%*
Loan interest	7.0	%
Nominal discount rate	10.0	%
Tax rate	35.0	%
Economic parameters		
Tipping fee ^a	20.0	US\$/t
Digest price ^b	7.1	US\$/t
Electricity price ^c	69.3	US\$/MWh
Low pressure steam price ^d	13.9	US\$/MWh
Cooling water price ^d	2.2	US\$/MWh

^a Taken from NREL report.¹⁶
^b Taken from system-level study.¹⁷
^c Taken from U.S. EIA data.¹⁸
^d Taken from system-level study.¹⁹
* Percent of total capital investment

Table S28. Economics of GV operations using green energy

		Unit: \$/mile			
	Types	China	India	USA	Brazil
Well-to-pump	Biomethane	0.63	0.52	0.50	0.52
	Bioethanol	0.60	0.60	0.60	0.60
	Biohydrogen	0.25	0.24	0.24	0.24
	Bioelectricity	0.97	0.79	0.81	1.04
Pump-to-wheel	Biomethane	0.15	0.15	0.15	0.15
	Bioethanol	0.15	0.15	0.15	0.15
	Biohydrogen	0.24	0.24	0.24	0.24
	Bioelectricity	0.32	0.32	0.32	0.32
Total	Biomethane	0.78	0.67	0.65	0.66
	Bioethanol	0.74	0.74	0.75	0.75
	Biohydrogen	0.49	0.48	0.48	0.48
	Bioelectricity	1.29	1.12	1.14	1.36

S.5 Environmental analysis

Table S29. Environmental impacts of GV operations using green energy

Impact categories	Types	China	India	USA	Brazil	
GWP (kg CO ₂ /t of FW)	Well-to-pump	Biomethane	24.11	31.02	33.65	33.70
		Bioethanol	19.13	20.02	20.05	20.01
		Biohydrogen	24.05	26.16	27.75	27.58
		Bioelectricity	1.90	2.48	2.50	2.02
	Pump-to-wheel	Biomethane	100.62	133.08	118.77	110.51
		Bioethanol	334.17	344.28	318.15	301.13
		Biohydrogen	128.95	144.54	151.01	147.21
		Bioelectricity	74.19	89.41	93.78	98.77
FD (kg oil/t of FW)	Well-to-pump	Biomethane	0.95	1.23	1.33	1.33
		Bioethanol	1.92	2.01	2.01	2.01
		Biohydrogen	7.42	8.08	8.57	8.52
		Bioelectricity	0.54	0.70	0.71	0.57
	Pump-to-wheel	Biomethane	6.57	13.56	8.38	4.93
		Bioethanol	72.43	70.83	57.41	50.69
		Biohydrogen	8.21	10.64	10.37	9.39
		Bioelectricity	2.39	3.06	3.39	3.60
PM (kg PM _{2.5} /t of FW)	Well-to-pump	Biomethane	0.01	0.01	0.01	0.01
		Bioethanol	0.01	0.01	0.01	0.01
		Biohydrogen	0.04	0.05	0.05	0.05
		Bioelectricity	0.00	0.00	0.00	0.00
	Pump-to-wheel	Biomethane	0.05	0.12	0.09	0.02
		Bioethanol	0.09	0.15	0.13	0.06
		Biohydrogen	0.05	0.07	0.07	0.05
		Bioelectricity	0.00	0.00	0.00	0.00
TA (kg SO ₂ /t of FW)	Well-to-pump	Biomethane	0.02	0.02	0.02	0.02
		Bioethanol	0.03	0.03	0.03	0.03
		Biohydrogen	0.17	0.19	0.20	0.20
		Bioelectricity	0.01	0.01	0.01	0.01
	Pump-to-wheel	Biomethane	0.11	0.16	0.08	0.06
		Bioethanol	0.25	0.28	0.19	0.16
		Biohydrogen	0.19	0.22	0.22	0.21
		Bioelectricity	0.01	0.01	0.02	0.01

Table S30. GHG emission of GV operations using green energy

		Unit: kg CO ₂ /mile			
Types		China	India	USA	Brazil
Well-to-pump	Biomethane	0.994	1.031	0.792	0.714
	Bioethanol	1.810	1.780	1.633	1.544
	Biohydrogen	0.476	0.494	0.485	0.474
	Bioelectricity	1.410	1.299	1.355	1.776
Pump-to-wheel	Biomethane	0.313	0.313	0.313	0.313
	Bioethanol	0.110	0.110	0.110	0.110
	Biohydrogen	0.109	0.109	0.109	0.109
	Bioelectricity	0.037	0.037	0.037	0.037
Well-to-wheel	Biomethane	1.307	1.344	1.105	1.027
	Bioethanol	1.920	1.890	1.743	1.654
	Biohydrogen	0.586	0.603	0.594	0.583
	Bioelectricity	1.447	1.336	1.392	1.813

Reference

1. S. GOTA, C. HUIZENGA and K. PEET, *SLOCAT. Beijing: SLOCAT*, 2015.
2. *SuperPro Designer v10*, Inteligen, Inc., 2019.
3. I. Angelidaki, L. Ellegaard and B. K. Ahring, *Biotechnology and bioengineering*, 1993, **42**, 159-166.
4. I. Angelidaki, L. Ellegaard and B. K. Ahring, *Biotechnology and bioengineering*, 1999, **63**, 363-372.
5. N. Azbar and D. B. Levin, *State of the art and progress in production of biohydrogen*, Bentham Science Publishers, 2012.
6. C. A. Grande and A. E. Rodrigues, *Industrial & engineering chemistry research*, 2007, **46**, 4595-4605.
7. S.-I. Yang, D.-Y. Choi, S.-C. Jang, S.-H. Kim and D.-K. Choi, *Adsorption*, 2008, **14**, 583-590.
8. W.-G. Kim, J. Yang, S. Han, C. Cho, C.-H. Lee and H. Lee, *Korean Journal of Chemical Engineering*, 1995, **12**, 503.
9. D.-G. Choe, D.-Y. Choe, S.-H. Kim, U.-S. An and S.-C. Jang, *Korean Chemical Engineering Research*, 2006, **44**.
10. L. Wang, Y. Cheng, X. Xiao and X. Li, *Journal of Chemical & Engineering Data*, 2007, **52**, 1255-1257.
11. *ASPEN Plus Process Simulator V10*, Aspen Technology, Inc., 2017.
12. E. E. Kwon, J.-M. Jung, H. J. Kim and J. Lee, *Environmental Research*, 2020, DOI: 10.1016/j.envres.2020.109199.
13. S. Wang, W. Guo, H. Wang, L. Zhu, S. Yin and K. Qiu, *New Journal of Chemistry*, 2014, **38**, 2792-2800.
14. M. Mozdierz, G. Brus, A. Sciazko, Y. Komatsu, S. Kimijima and J. Szmyd, *Flow, Turbulence and Combustion*, 2016, **97**, 171-189.
15. I. Govender, G. A. Thopil and R. Inglesi-Lotz, *Journal of Cleaner Production*, 2019, **214**, 154-165.
16. K. Moriarty, *Feasibility Study of Anaerobic Digestion of Food Waste in St. Bernard, Louisiana. A Study Prepared in Partnership with the Environmental Protection Agency for the RE-Powering America's Land Initiative: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites*, National Renewable Energy Lab.(NREL), Golden, CO (United States), 2013.
17. J.-R. Bastidas-Oyanedel and J. E. Schmidt, *Energies*, 2018, **11**, 1551.
18. Average Price of Electricity to Ultimate Customers, https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_03, (accessed November 5, 2018).
19. J. Byun and J. Han, *Green Chemistry*, 2017, **19**, 5214-5229.