Table S1. Equipment specification and cost.

Equipment	Description	Unit Cost (€)	Base Case		Alternative 1		Alternative 2	
			Quantity	Cost (€)	Quantity	Cost (€)	Quantity	Cost (€)
Disk-Stack Centrifuge	Throughput = 3.88 m^3/h	270,000	1	270,000	1	270,000	1	270,000
Crystallizer	Vessel Volume = 10872.54 L	236,000	1	236,000	1	236,000	1	236,000
GAC Adsorber	Column Volume = 22865.71 L	197,000	1	197,000	1	197,000	1	197,000
Ion Exchanger 1	Column Volume = 14239.87 L	166,000	1	166,000	1	166,000	1	166,000
Ion Exchanger 2	Column Volume = 11048.14 L	153,000	1	153,000	1	153,000	1	153,000
Rotary Dryer	Drying Area = 23.16 m^2	102,000	1	102,000	1	102,000	1	102,000
Rotary Vacuum Filter	Filter Area = 5.67 m^2	75,000	1	75,000	1	75,000	1	75,000
Main Fermentor	Vessel Volume = 34.48 m^3	64,000	3	192,000	3	192,000	3	192,000
Seed Fermentor	Vessel Volume = 1.69 m^3	56,000	1	56,000	1	56,000	1	56,000
Pre-seed Fermentor	Vessel Volume = 0.08 m^3	56,000	1	56,000	1	56,000	1	56,000
Flat Bottom Tank	Vessel Volume = 100 m^3	50,000	1	50,000	1	50,000	1	50,000
Blending Tank	Vessel Volume = 18.34 m^3	50,000	1	50,000	2	100,000	2	100,000
Heat Exchanger	Heat Exchange Area = 34.80 m^2	41,000	1	41,000	1	41,000	1	41,000
Pump	Rated Throughput = 148.97 kg/h	4,000	3	12,000	3	12,000	3	12,000
TOTAL				**1,656,000**		**1,706,000**		**1,706,000**

The size of each piece of equipment was automatically calculated by SuperPro Designer based on the reaction parameters. The cost of each piece of equipment was calculated followed by Towler and Sinnott [1].

$$C_e = a + bS^n \qquad \text{Equation S1}$$

Where,

C_e = purchased equipment cost on a U.S. Gulf Coast basis, January 2006 (CE index = 478.6, NF refinery inflation index = 1961.6);

a, b = cost constants Table 6.6 in Towler and Sinnott's book;

S = size parameter, units given in Table 6.6 in Towler and Sinnott's book;

n = exponent for that type of equipment.

Since the calculated value is adjusted to the price of January 2006, it was corrected with the CE index of February 2022 (806.3).

Table S2. Purchase cost of raw materials and annual utilization of each case.

Bulk Material	Unit Purchase Cost (€)	Unit	Base Case		Alternative 1		Alternative 2		Reference
			Amount	Cost (€)	Amount	Cost (€)	Amount	Cost (€)	
Ammonia	0.140	kg	10,408	1,457	10,408	1,457	10,408	1,457	[2]
Biogas	0.172	kg					401,006	68,973	[3]
Calcium chloride	0.160	kg	5,361	858	5,361	858	5,367	859	[4]
Carbon dioxide	0.033	kg	261,458	8,628	261,458	8,628	2,238	74	[5]
Glucose	1.089	kg	1,252,020	1,363,450	13,286	14,468	13,302	14,486	[6]
H_2SO_4	0.049	kg	952,836	46,689	952,172	46,656	952,173	46,646	[4]
Magnesium chloride	0.077	kg	5,361	413	5,361	413	5,367	413	[2]
Methanol	0.168	kg	1,717,415	288,526	1,717,415	288,526	1,717,415	288,526	[2]
Potassium phosphate dibasic	1.473	kg	80,415	118,451	80,415	118,451	80,513	118,596	[4]
Sodium chloride	0.154	kg	26,805	4,128	26,805	4,128	26,837	4,133	[4]
Yeast extract	1.611	kg	268,048	431,825	268,048	431,825	268,377	432,355	[7]
Total				**2,264,424**		**915,410**		**976,528**	

Table S3. Deterministic price of utility, consumable, wastewater treatment, and annual utilization of each case.

Utility	Unit Cost (€)	Unit	Base Case		Alternative 1		Alternative 2		Reference
			Amount	Cost (€)	Amount	Cost (€)	Amount	Cost (€)	
Electricity	0.07	kW-h	293,395	20,552	294,984	20,664	307,460	21,538	[8]
Steam	12	ton	20,908	276,586	20,893	276,376	20,896	276,402	[9]
Chilled Water	0.4	ton	243,996	107,584	243,999	107,585	243,999	107,585	[9]
Glycol	0.245	ton	16,357	4,421	16,673	4,506	16,673	4,506	SuperPro
Activated carbon	2.80	kg	142	398	143	400	143	400	SuperPro
DOWEX G-26	56.82	kg	18	1,015	18	1,020	18	1,020	[10]
PVP	600	kg	191	114,623	192	115,604	192	115,604	[11]
Wastewater	0.041	m^3	116,451	4,774	117,525	4,818	117,526	4,819	[12]
Total				**529,953**		**530,973**		**531,874**	

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