Supplementary material

Table S1. Technical data related to different equipment used for lactic acid production.

Discrete modeling steps/ Equipment	Equipment parameter	Units	Base Size	Base value ($)	Base year	Exp*
	Length	m	30.48			
Belt conveyor [1]	Width	cm	60.96	70,000	2009	0.8
	Power	W/kg/s	720			
Grinder [1]	Throughput	t/h	28	302,000	2000	0.6
	Diameter	cm	35.56			
Screw conveyor [2]	Length	m	30.48	20,000	2009	0.8
	Specific power	W/((m^3/s)*m)	10,800			
Bucket elevator [2]	Throughput	t/hr.				
Storage [2]	Volume	m^3	20000	3,500,000	2009	0.6
	Diameter	cm	35			
Screw conveyor [2]	Length	m	30.48	20,000	2009	0.8
	Specific power	W/((m^3/s)*m)	10,800			
Heat exchanger [2]	Area	m^2	120	118000	2018	
Acid storage tank [2]	Volume	m^3	48	6210	2010	0.7
Pump [2]						
Acid hydrolysis reactor [2]	Volume	m^3	36.70	19,812,400	2009	0.6
Flash cooling tank [2]	Volume	m^3	416.4	511,000	2009	0.7
Neutralization tank [2]	Volume	m^3	446.7	236,000	2009	0.7
Cooling unit [2]	Area	m^2	14.3	38,000		
Enzymatic hydrolysis reactor [2]	Volume	m^3	3256	837,000	2015	0.6
Seed fermenter [2]	Volume	m^3	900	300,000	2008	0.5
Fermentation tank [2]	Volume	m^3	3256	837,000	2015	0.6
Storage tank [2]	Volume	m^3	2325	165,800	1997	0.5
Dryer [3]	Area	m^2	80.12	8,349	2002	0.6
Rotary vacuum filter [4]	Filter area	m^2	101	254,000		
Neutralization tank [2]	Volume	m^3	446.7	236,000	2009	0.7
Gypsum removal filter	Filter area	m^2	65	195,000		
Evaporator	Area	m^2	315	2068000		
Distillation column [4]	Volume	m^3	212	879,000		
Distillation column [4]	Volume	m^3	119	420,000		
Lignin removal [4]	Area	m^2	342	525,000		
Anerobic digester [4]	Volume	m^3	22463	2,989,000	2015	
Steam generator [4]	Throughput	t/hr.	65	696,000	2018	
Steam turbine [4]	Power	kW	6705	1444000	2018	

Note: * Exponent for size factor

[1] Wright et. al., 2010

[2] Humbird et. al., 2011

[3] Jones et al., 2013

[4] Superpro Designer®

References

1. Wright MM, Satrio J, Brown RC, Daugaard DE, et al. Techno-economic analysis of biomass fast pyrolysis to transportation fuels. Technical Report NREL/TP-6A20-46586 (2010).
2. Humbird D, Davis R, Tao L, et al. Process Design and Economics for Biochemical Conversion of Lignocellulosic Biomass to Ethanol. Technical Report NREL/LTP-5100-47764 (2011).
3. Jones S, Meyer P, Snowden-Swan L, et al. Process design and economics for the conversion of lignocellulosic biomass to hydrocarbon fuels: Fast pyrolysis and hydrotreating bio-oil pathway. Technical Report PNNL-23053\NREL/TP-5100-61178 (2013).
4. Intelligen Inc. SuperPro Designer Software Version 10. (2023).

,