Supplementary material

Table S1. Technical data related to the equipment (base size, base cost, scale factor, number, size and cost)

Processes/ Equipment	Equipment parameter	Units	Base Size	Base value ($)	Base year	Exponent	Design Size	No.	Cost in 2018 ($/unit)
Feedstock preparation									
	Length	m	30						
Belt conveyor [1]	Width	cm	61	70,000	2009	0.8	30	1	76,000
	Power	W/kg/s	720						
Grinder [1]	Throughput	t/h	28	302,000	2000	0.6	21	1	364,000
Bucket elevator [2]	Throughput	t/h					10	1	18,000
Storage [2]	Volume	m^3	20,000	3,500,000	2009	0.6	1,750	2	879,000
Liquefaction and saccharification									
	Diameter	cm	35						
Screw conveyor [2]	Length	m	30	20,000	2009	0.8	30	2	22,000
	Specific Power	W/((m^3/s) m)	10,800						
Jet cooker [4]	Volume	m^3	5	100,000	2016	0.6	7.2	1	130,000
Heat exchanger [3]	Area	m^2	80.12	8,349	2002	0.6	60	1	81,000
Saccharification tank [4]	Volume	m^3	400	500,000	2016	0.6	675	7	713,000
Fermentation									
Heat exchanger [3]	Area	m^2	22	85000	2010	0.7	33.5	2	117,000
Seed fermenter [2]	Volume	m^3	900	300,000	2008	0.5	41	3	63,000
							206	3	141,000
Fermentation tank [2]	Volume	m^3	3,256	837,000	2015	0.6	4,030	3	966,000
Storage tank [2]	Volume	m^3	2,325	165,800	1997	0.5	1,260	2	177,000

Processes/ Equipment	Equipment parameter	Units	Base Size	Base value ($)	Base year	Exponent	Design Size	No.	Cost in 2018 ($/unit)
Product separation and recovery									
Neutralization tank [2]	Volume	m^3	446.7	236,000	2009	0.7	318	1	201,000
Gypsum removal filter [4]	Filter area	m^2					400	1	520,000
Dryer [3]	Area	m^2	80.12	8,349	2002	0.6	890	1	51,000
Distillation column [4]	Volume	m^3					213.3	3	641,000
Distillation column [4]	Volume	m^3					110	2	364,000
Esterification reactor [2]	Volume	m^3	3,256	837,000	2015	0.6	39.5	3	60,000
Hydrolysis reactor [2]	Volume	m^3	3,256	837,000	2015	0.6	36	2	57,000
Stillage utilization									
Centrifuge [4]	Throughput	m^3/hr.			2018		42.2	1	234,000
Rotary dryer [4]	Area	m^2					567	1	39,000
Thin film evaporator [4]	Area	m^2			2018		22	1	439,000

References for supplementary material

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).
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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).
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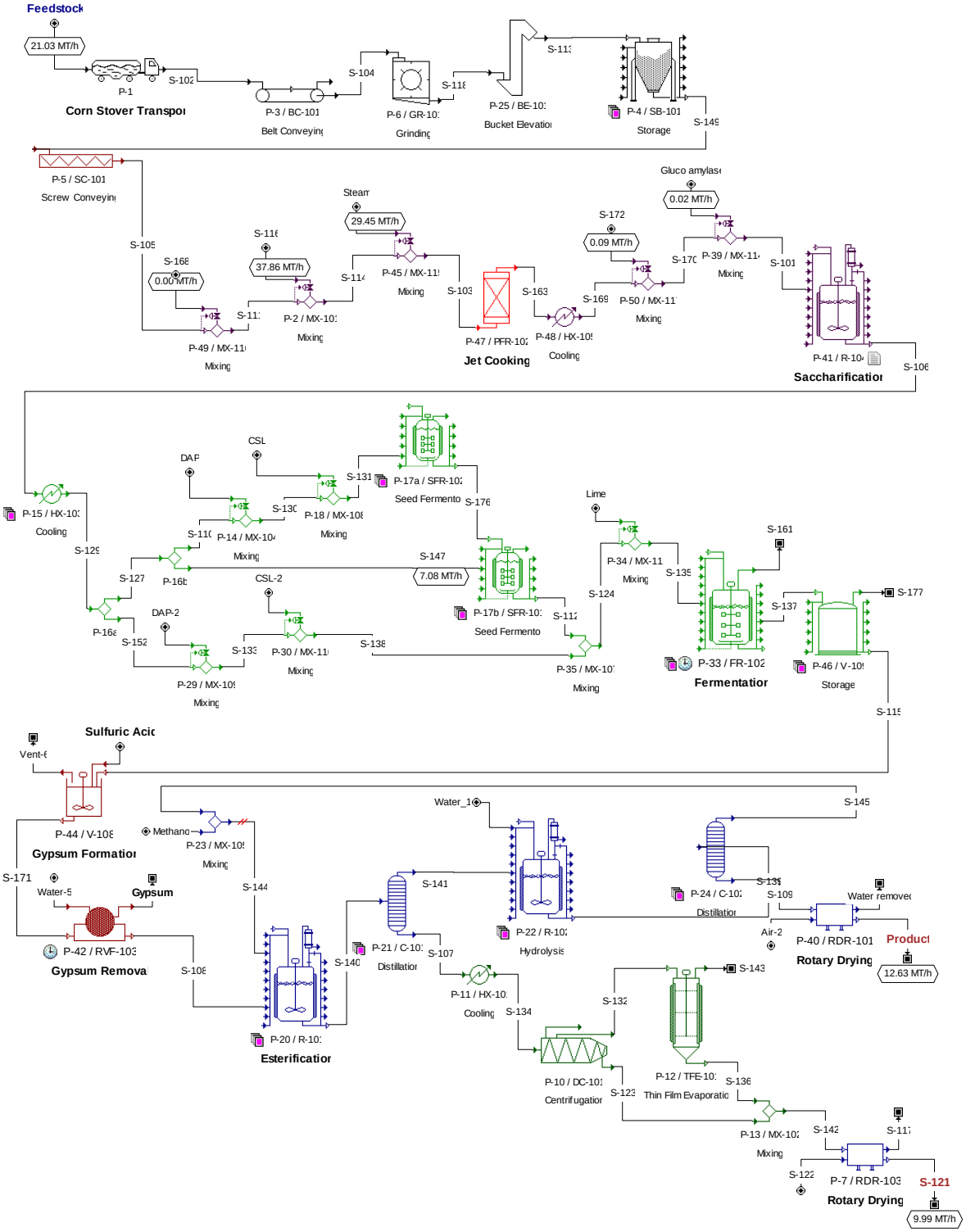

Fig S1. Detailed process flow of the processes (obtained from the SuperPro Designer software)