

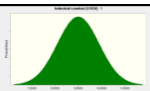
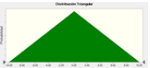
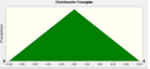

Supplementary information

Table S1 lists the potential critical parameters selected according to the bibliography. Each parameter has the distribution to which it belongs, the minimum, most likely, and maximum values.

Table S1. Sensitivity analysis configuration.

Parameter	Distribution function	Value			Units	Standard deviation
		Minimum	Most likely	Maximum		
Ethylene price ^{1,2}	 Triangular ^{3,4}	700	1400	1680	USD/t	
Lignin price ¹	 Triangular ³	400	800	960	USD/t	
Feedstock cost ^{1,5}	 Normal ⁶		9		USD/t	10% μ
Water ⁷	 Uniform ³	0.5	0.6	0.8	USD/m ³	
Ethanol ²	 Normal ⁸		887		USD/t	10% μ
NaOH	 Uniform ^a	500	600	700	USD/t	
H ₂ SO ₄	 Uniform ^a	80	90	100	USD/t	
Enzymes cost ⁹	 Triangular ⁶	8,000	10,000	15,000	USD/t	
Electricity cost ¹	 Triangular ^{4,6,10}	0.03	0.08	0.09	USD/kWh	
Steam cost ¹	 Triangular ⁶	8	10	15	USD/t	
SSF conversion ⁹	 Uniform ^{9,11}	0.94	0.96	0.98	g ethanol /g liquor	
LSR pretreatment ⁹	 Normal ^a		5.44		t/t	10% μ
Steam economy ⁹	 Uniform ¹¹	2.5	2.6	2.8	t steam/ t IS	

^a Assumption

Availability feedstock ⁵			200,000		t	10 % μ
	Normal ^a					
Labor ⁹		1,126,400	10,76,400	1,026,400	USD	
	Triangular ¹⁰					
Optimal washing ratio ⁹		4	3.5	3	kg water/kg dry pulp	
	Triangular ^a					
Contingency factor		5	10	15	%	
	Triangular ¹⁰					

^a Assumption

References

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Table S2 displays the values depicted in Figure 6: Tornado charts.

Table S2. Tornado charts values

Input variable	NPV			Variation explanation ¹
	Down	Up	Range	
Lignin selling price (USD/t)	-75.323.180 USD	37.426.345 USD	112.749.525 USD	41,08%
Ethylene selling price (USD/t)	-66.943.417 USD	34.074.439 USD	101.017.856 USD	74,06%
Energy (USD/kWh)	59.118.263 USD	-5.569.019 USD	64.687.282 USD	87,58%
LSR pretreatment (w/w)	22.295.948 USD	-13.295.205 USD	35.591.152 USD	91,68%
Enzymes (USD/kg)	15.181.318 USD	-19.710.613 USD	34.891.931 USD	95,61%
Feedstock Availability (t/y)	-8.112.592 USD	20.687.565 USD	28.800.157 USD	98,29%
Steam (USD/t)	10.400.204 USD	-7.757.829 USD	18.158.034 USD	99,36%
Ethanol (USD/L)	8.064.728 USD	933.394 USD	7.131.334 USD	99,52%
Contingency factor (USD)	8.765.796 USD	1.658.593 USD	7.107.203 USD	99,68%
NaOH (USD/kg)	8.597.574 USD	1.826.815 USD	6.770.759 USD	99,83%
SSF conversion (%)	2.425.818 USD	8.033.407 USD	5.607.589 USD	99,93%
Steam economy (t evaporated water/t steam)	6.209.889 USD	3.216.806 USD	2.993.082 USD	99,96%
Industrial sawdust (USD/t)	6.180.830 USD	3.274.924 USD	2.905.905 USD	99,99%
Water (USD/m ³)	5.614.309 USD	4.407.966 USD	1.206.343 USD	99,99%
Optimal washing ratio (t water/t dry pulp)	4.728.209 USD	5.696.181 USD	967.972 USD	100,00%
Labor (USD)	5.672.296 USD	4.752.093 USD	920.203 USD	100,00%
H ₂ SO ₄ (USD/kg)	5.218.242 USD	5.206.147 USD	12.095 USD	100,00%

¹ The explanation of variation 1 is cumulative