

# Supplementary file

**Table S1:** Capital cost components employed in TCI (CAPEX) determination [1, 2]

Cost component	Estimation approach
Warehouse (W)	4% of SIC
Site Development (SD)	9% of SIC
Additional Piping (AP)	4.5% of SIC
Total direct cost (TDC)	AP+SD+W+TEIC
Prorateable Expenses (PE)	10% of TDC
Field Expenses (FE)	10% of TDC
Home Office & Construction (HC)	20% of TDC
Project Contingency (PC)	10% of TDC
Other Costs (O)	10% of TDC
Total Indirect Cost (TIC)	
Fixed Capital Investment (FCI)	TDC+TIC
Working Capital (WC)	5% of sum of FCI
Total Capital Investment (TCI)	Sum of FCI+WC

**Table S2:** Correlations employed in operating cost (OPEX) determination

Cost component	Estimation approach	Some notes	Remarks	Reference
Salaries for labour and supervision (LS)	$N_w$ × average individual salary	$N_w = (6.29 + 31.7p^2 + 0.23n)^{0.5}$ $N_w$ denotes the number of workers, $p$ is the number of processing steps involving solids and $n$ is the number of other processing steps.	Workers paid £10.57per h	Assumed
Labour burden (LB)	90% of total salaries	Additional labour costs in addition to the salary.	It may include costs such as retirement benefits, health benefits etc.	[3]
Maintenance (M)	3% of purchased equipment cost	Cost necessary to maintain the plant for sustained productivity		
Property insurance (PI)	0.7% of Sum of FCI	Cost incurred to insure the plant		[1, 2]
Fixed operating cost (FOC)	PI+M+LB+LS			
Raw materials	Based on unit market prices and mass consumed	Cost of feedstock, chemical, organic and inorganic inputs		

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Variable	
operating cost	
(VOC)	
Total operating	FOC + VOC
Cost (TOC)	

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The purchase cost of the inputs of trypsin enzyme, HCl, NaOH and *L. paracasei* were specified as £82 per kg<sup>1</sup>, £0.1204 per kg<sup>2</sup>, £0.01 per kg<sup>3</sup> and £ 0.043 per liter [4], respectively.

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<sup>1</sup> Source : [https://www.alibaba.com/product-detail/Manufacturers-Supply-Aid-Trypsin-Enzyme-Trypsin\\_1600547917760.html?spm=a2700.7724857.0.0.349f6a84Z43g3B](https://www.alibaba.com/product-detail/Manufacturers-Supply-Aid-Trypsin-Enzyme-Trypsin_1600547917760.html?spm=a2700.7724857.0.0.349f6a84Z43g3B) (assessed 12/08/2022)

<sup>2</sup> Source: <https://sjzxlwchem.en.made-in-china.com/product/gXvnKSTkZori/China-High-Purity-Hydrochloric-Acid-Price-31-36-Muriatic-Acid-.html> (assessed 12/08/2022)

<sup>3</sup>Source: [https://www.alibaba.com/product-detail/Chemical-Sodium-Hydroxide-Chemical-Sodium-Hydroxide\\_10000005754056.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.189618d8W84lZd](https://www.alibaba.com/product-detail/Chemical-Sodium-Hydroxide-Chemical-Sodium-Hydroxide_10000005754056.html?spm=a2700.galleryofferlist.normal_offer.d_title.189618d8W84lZd) (assessed 12/08/2022)

## References

1. Humbird, D., et al., *Process Design and Economics for Biochemical Conversion of Lignocellulosic Biomass to Ethanol: Dilute-Acid Pretreatment and Enzymatic Hydrolysis of Corn Stover*: NREL Technical Report: NREL/TP-5100-47764. 2011, National Renewable Energy Laboratory: Colorado.
2. Zyl, v.M., *Valorisation of Bio-aromatics from Pulp Mill Residues and Commercial Forest Species in South Africa*. 2017, Stellenbosch university Stellenbosch.
3. TDT, *Fourth Quarter 2007 Guide to Labor Burden*. 2007, Texas department of transportation.
4. Carpinelli Macedo, J.V., et al., *Cost-effective lactic acid production by fermentation of agro-industrial residues*. *Biocatalysis and Agricultural Biotechnology*, 2020. **27**: p. 101706.