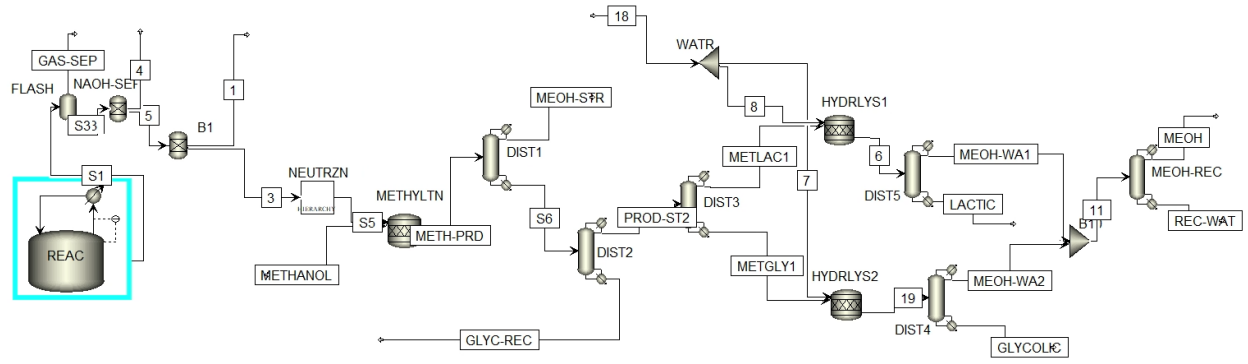
Test Table 1.

Equipment Type	Location	Model available (yes/no)	Model Type	Predicted usage (Hours/day)
3 glass door back bar cooler	Gallery	Y	EFI CBBGD3-72CC	24
Double Door Sandwich Prep Refrigerator	Gallery	Y	TUC-48-HC	24
Combi Oven	Gallery	Y	Convotherm maxx pro easyTouch 10.10	2
4 Basket 2 Unit Fryer	Gallery	Y	SELV14	2
6 Burner Range w/ Oven	Gallery	Y	G36-6C NAT	3
Charbroiler	Gallery	Y	CELC-RRB-24	3
Griddle	Gallery	Y	GTGG24-GT24M	2.5
2 Drawer Refrigerated base	Gallery	Y	TRCB-48	24
Salamander Broiler	Gallery	Y	GIR36	2
Solid Door Reach - In Freezer	Gallery	Y	T-19-HC	24
Freezer	Gallery	Y	T-49-HC	24



Test Fig. 1

Test Table 2.

Unit block/Input	Value	Output/Product*	Value
Reactor			
Glycerol	1678 kg/h	Lactic acid	115.5 kg
Sodium hydroxide	1474 kg/h	Glycolic acid	38.6 kg
Water	1814 kg/h	Oxalic acid	20.7 kg

Temperature	60 ^{o}C	Formic acid	179.5 kg
Pressure	1 bar		
Conversion	32 %		
Neutralization			
Calcium Hydroxide	159 kg/h	Calcium lactate	125.9 kg
Temperature	100 C	Calcium glycolate	43.5 kg
Pressure	1 bar		
Conversion	90%		
Acidification			
H_2SO_4	336 kg/h	Lactic acid	105.1 kg
Temperature	130 ^{o}C	Glycolic acid	35.2 kg
Pressure	1 bar		
Conversion	90%		
Methylation			
Methanol	336 kg/h	Methyl lactate	119 kg
		Methyl glycolate	40.8 kg
Distillation – DIST1			
Light key: Methanol	99.5%	Top product: Methanol	295 kg (95%)
Heavy key: Methyl lactate	0.1% (top prod.)	Bottom product: Methyl lactate	118.9 kg
Condenser pressure	1 bar		
Reboiler pressure	3 bar		
Reflux ratio	0.2		
Distillation – DIST2 (Glycerol recovery)			
Light key: Methyl glycolate	99.5%	Top product: Methyl lactate	118.9 kg
Heavy key: Glycolic acid	0.1% (top prod.)	Bottom product: Glycerol	1167 kg (99.5%)
Condenser pressure	1 bar		
Reboiler pressure	2 bar		
Reflux ratio	0.5		
Distillation – DIST3			
Light key: Methyl lactate	99.5%	Top product: Methyl lactate	118.9 kg
Heavy key: Methyl glycolate	0.1% (top prod.)	Bottom product: Methyl glycolate	1167 kg (99.5%)
Condenser pressure	1 bar		
Reboiler pressure	2 bar		
Reflux ratio	3.8		
Hydrolysis (HYDRLYS1 and -2)			
Water	181 kg	Lactic acid	100.1 kg
Temperature	25 ^{o}C	Glycolic acid	33.5 kg
Conversion	98%		
Distillation – DIST4			

Light key: Water	99.5%	Top product: Methanol/water	52 kg
Heavy key: Glycolic acid	0.1% (top prod.)	Bottom product: Glycolic acid	33.5 kg
Condenser pressure	1 bar		
Reboiler pressure	2 bar		
Reflux ratio	0.1		
Distillation – DIST5			
Light key: Water	99.5%	Top product: Methanol/water	178.2 kg
Heavy key: Lactic acid	0.1% (top prod.)	Bottom product: Glycolic acid	33.5 kg
Condenser pressure	1 bar		
Reboiler pressure	2 bar		
Reflux ratio	0.1		
Methanol recovery (MEOH-REC)			
Light key: Methanol	99.5%	Top product: Methanol	51 kg (99.6%)
Heavy key: Water	0.1% (top prod.)	Bottom product: Water	175 kg
Condenser pressure	1 bar		
Reboiler pressure	2 bar		
Reflux ratio	9		

Test Table 3.

Input						
Variable name in LCA model	*Flow name*	*Amount*	*Unit*	*Provider*	*Location*	*Database*
Process electricity use	electricity, medium voltage	2.77 + 11.9*	kWh	market for electricity, medium voltage	RoW	ecoinvent 3.5 cutoff (unless specified)
Crude glycerol as feedstock	glycerine	3.84	kg	esterification of soybean oil	RoW	
Waste treatment (formic acid, glyceric acid (as unconverted glycerol), oxalic acid)	hazardous waste, for incineration	-1.63	kg	treatment of hazardous waste, hazardous waste incineration	RoW	
Process heat use	heat, from steam, in chemical industry	21.75	MJ	steam production, as energy carrier, in chemical industry	RoW	
$Ca(OH)_2$	lime	1.86	kg	lime production, milled, loose	RoW	
Methanol	methanol	0.13	kg	methanol production	GLO	
Sulfuric acid	sulfuric acid	2.52	kg	sulfuric acid production	RoW	

Process water use	water, completely softened, from decarbonised water, at user	0.05	kg	water production, completely softened, from decarbonised water, at user	RoW	
Waste treatment ($CaSO_4$)	waste gypsum	3.49	kg	treatment of waste gypsum, sanitary landfill	RoW	
Cooling water use	cooling water	14.25	MJ	cooling water production_customized	RoW	this project
Output						
Variable name in LCA model	*Flow name*	*Amount*	*Unit*	*Provider*	*Location*	*Database*
Lactic acid	lactic acid from electrocatalysis	1	kg	lactic acid production from electrocatalysis	RoW	this project