

## Key assumptions in techno-economic assessment

**Table S1:** All values for RCF are taken from Arts et al. <sup>1</sup> and for RCD from Jusner et al. <sup>2</sup>, unless otherwise stated.

<sup>a</sup> Adapted from <sup>1</sup> for 0% solvent recycling, <sup>b</sup> Assuming improvement in lignin solubility from 47% to 70%, <sup>c</sup> Based on <sup>3</sup> and Flanders Industry Innovation NIBCON project report, <sup>d</sup> Based on <sup>4</sup>, <sup>e</sup> Assumption, <sup>f</sup> Based on Belgian labour data for 2022, <sup>g</sup> Based on Belgian corporate tax rate in 2024, <sup>h</sup> Adjusted from <sup>1</sup> using a 0.6 scaling factor and Chemical Engineering Plant Cost Index for 2023, <sup>i</sup> Based on <sup>5</sup>, with single reactor assumed instead of two reactors as in that article. Plant size adjusted with 0.6 scaling factor. Plant costs updated using Chemical engineering Plant Cost Index., <sup>j</sup> Assuming unit capital cost to be half of that in the Base case, <sup>k</sup> Based on average European Posted Contract Price for 2023-24 <sup>6</sup>, <sup>l</sup> Estimated clean hydrogen price in Europe in 2030, <sup>m</sup> Based on 2022 Belgium baseload electricity prices, <sup>n</sup> Based on data from Echemi <sup>7</sup>, as accessed in December 2024, <sup>o</sup> Based on ASPEN modelling.

Parameter	Value			
	RCF with liquor recycling	RCF without liquor recycling	RCD – Base	RCD - Improved
Feedstock	Birch wood	Birch wood	Hydrolysis lignin	Hydrolysis lignin
Solvent-feedstock ratio	2	10 <sup>a</sup>	14.3	6.7
Feedstock to oil conversion (%)	17.4	17.4	40	60 <sup>b</sup>
Feedstock price (€/t)	158	158	500	500
Byproduct price (€/t) <sup>c</sup>	400	400	300	400
Catalyst quantity (kg/kg/h)	0.1	0.1	0.76	0.76
Catalyst lifetime (y) <sup>d</sup>	0.08	0.08	0.08	0.08
Operating hours (h/y)	8000	8000	8000	8000
Solvent recovery (%)	99.9	99.9	99.9	99.9
Hydrogen recycling (%) <sup>e</sup>	90	90	90	90
Feedstock temperature (°C) <sup>e</sup>	20	20	20	20
Salary per personnel (€/y) <sup>f</sup>	73,000	73,000	73,000	73,000
Maintenance cost (% of capital cost) <sup>e</sup>	1.5	1.5	1.5	1.5
Repair cost (% of capital cost) <sup>e</sup>	1	1	1	1
Insurance cost (% of capital cost) <sup>e</sup>	0.5	0.5	0.5	0.5
Weighted Average Cost of Capital (%) <sup>e</sup>	6	6	6	6
Economic lifetime (y) <sup>e</sup>	20	20	20	20
Corporate tax rate in Belgium (%) <sup>g</sup>	25	25	25	25
Capital costs (million €)	161 <sup>h</sup>	205 <sup>h</sup>	338 <sup>i</sup>	133 <sup>j</sup>
Methanol price (€/t) <sup>k</sup>	500	500	500	500
Hydrogen price (€/t) <sup>l</sup>	2000	2000	2000	2000
Catalyst price (€/t) <sup>d</sup>	210,000	210,000	42,000	42,000
Electricity price (€/MWh) <sup>m</sup>	180	180	180	180
Water price (€/m <sup>3</sup> )	0.5	0.5	0.5	0.5
Ethyl acetate price (€/t) <sup>n</sup>	1200	1200	-	-
Steam price (€/t) <sup>o</sup>	18.1	18.1	18.1	18.1

## References

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