Low Carbon Hydrogen production from waste based Biorefinery System and Environmental Sustainability Assessment †

Omprakash Sarkar[a,b], Ranaprathap Katakojwala[a,b], S. Venkata Mohan[a,b*]

[a]Bioengineering and Environmental Sciences Lab, Department of Energy and Environmental Engineering (DEEE), CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad-500007, India.
[b]Academy of Scientific and Innovative Research (AcSIR), Ghaziabad-201002, India.
*E-mail: svmohan@iict.res.in; vmohan_s@yahoo.com; Tel: 0091-40-27191765

S Table 1: Key categories required for addressing data quality in life cycle assessment

Category	Corresponding Information
Time related coverage	Round the calendar
Geographical coverage	Globally applicable
Technology coverage	Pilot scale study
Precision	Variance less than 5%
Completeness	96±1%
Representativeness	Accuracy 96±1%
Consistency	96±1%
Reproducibility	96±1%
Sources of the data	Ecoinvent v3.4 database
Uncertainty of the information	Acceptable (less than 0.5%)

S Table 2: Uncertainty analysis of standalone and integrated process to correlate the actual and expected results by quantifying the variability output with respect to the input

Impact category	Uncertainty value	
	Standalone process	Integrated approach
Aquatic acidification	0.02	0.02
Aquatic ecotoxicity	0.32	0.31
Aquatic eutrophication	0.71	0.67
Carcinogens	0.51	0.46
Global warming	0.01	0.01
Ionizing radiation	1.08	0.90
Land occupation	0.28	0.26
Mineral extraction	0.28	0.79
Non-carcinogens	1.05	0.96
Non-renewable energy	0.01	0.01
Ozone layer depletion	0.19	0.19
Respiratory inorganics	0.08	0.09
Respiratory organics	0.02	0.03
Terrestrial acidification/nutrification	0.01	0.01
Terrestrial ecotoxicity	0.29	0.30