



## OPEN ACCESS

APPROVED BY  
Frontiers Editorial Office,  
Frontiers Media SA, Switzerland

\*CORRESPONDENCE  
Valerie Rodin  
✉ rodin@energieinstitut-linz.at

†These authors share last authorship

RECEIVED 11 September 2023  
ACCEPTED 12 September 2023  
PUBLISHED 28 September 2023

## CITATION

Rodin V, Zeilerbauer L, Lindorfer J, Paulik C and Finger D (2023) Corrigendum: Life cycle assessment of a novel electrocatalytic process for the production of bulk chemical ethylene oxide from biogenic CO<sub>2</sub>. *Front. Sustain.* 4:1292549. doi: 10.3389/frsus.2023.1292549

## COPYRIGHT

© 2023 Rodin, Zeilerbauer, Lindorfer, Paulik and Finger. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](#). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# Corrigendum: Life cycle assessment of a novel electrocatalytic process for the production of bulk chemical ethylene oxide from biogenic CO<sub>2</sub>

Valerie Rodin<sup>1\*</sup>, Lukas Zeilerbauer<sup>1</sup>, Johannes Lindorfer<sup>1</sup>, Christian Paulik<sup>2†</sup> and David Finger<sup>1,3†</sup>

<sup>1</sup>Department of Energy Technology, Energieinstitut an der Johannes Kepler Universität Linz, Linz, Austria, <sup>2</sup>Institute for Chemical Technology of Organic Materials, Department of Chemistry and Polymer Engineering, Faculty of Engineering & Natural Sciences, Johannes Kepler University, Linz, Austria, <sup>3</sup>Department of Engineering, School of Technology, Reykjavik University, Reykjavik, Iceland

## KEYWORDS

carbon capture and utilization, Power to X, ethylene oxide, life cycle assessment, case study, sensitivity analysis, electrocatalysis, biogenic CO<sub>2</sub>

## A corrigendum on

Life cycle assessment of a novel electrocatalytic process for the production of bulk chemical ethylene oxide from biogenic CO<sub>2</sub>

by Rodin, V., Zeilerbauer, L., Lindorfer, J., Paulik, C., and Finger, D. (2022). *Front. Sustain.* 3:799389. doi: 10.3389/frsus.2022.799389

In the published article, there was an error in the caption for [Table 1](#) as published. The corrected [Table 1](#) and caption appears below. [Table S3](#) in the Supplementary Material has also been updated.

In the published article, there was an error in [Supplementary Table S3](#). In the original material, row A2, columns 'value (2030)' and 'value (2040)', incorrect numerical values are cited. In the original version the values were 0.118. The corrected values are 0.74; these can be seen in the correct material statement which appears below.

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

TABLE 1 LCI of analyzed process (absolute values).

Streams		Value (2030)	Value (2040)	Unit
<b>F</b>	<b>Feedstock</b>			
F1	CO <sub>2</sub>	3.0		kg/kg <sub>EO</sub>
F2	CO <sub>2</sub> recycling	13.1	3.03	kg/kg <sub>EO</sub>
F3	H <sub>2</sub> O	14.1	10.6	kg/kg <sub>EO</sub>
F4	Stoichiometric demand	10.6		kg/kg <sub>EO</sub>
<b>A</b>	<b>Auxiliaries</b>			
A1	electricity	0.35	0.16	GJ/kg <sub>EO</sub>
A2	steam	0.74		kg/kg <sub>EO</sub>
<b>I</b>	<b>Intermediates</b>			
I1	H <sub>2</sub> O <sub>2</sub>	6.03		kg/kg <sub>EO</sub>
I2	C <sub>2</sub> H <sub>4</sub>	0.829		kg/kg <sub>EO</sub>
I3	C <sub>2</sub> H <sub>4</sub>	0.637		kg/kg <sub>EO</sub>
<b>P</b>	<b>Products</b>			
P1	C <sub>2</sub> H <sub>4</sub> O	1		kg/kg <sub>EO</sub>
<b>S</b>	<b>Side-products</b>			
S1	H <sub>2</sub>	0.1450		kg/kg <sub>EO</sub>
S2	CH <sub>4</sub>	0.1290		kg/kg <sub>EO</sub>
S3	H <sub>2</sub> O <sub>2</sub>	5.26		kg/kg <sub>EO</sub>
<b>E</b>	<b>Direct emissions</b>			
E1	C <sub>2</sub> H <sub>4</sub>	0.03158		kg/kg <sub>EO</sub>
E2	H <sub>2</sub>	0.00022		kg/kg <sub>EO</sub>
E3	CH <sub>4</sub>	0.00523		kg/kg <sub>EO</sub>
E4	CO <sub>2</sub>	0.02984		kg/kg <sub>EO</sub>

For a more detailed version, see [Supplementary Table S3](#).

Table S3 Life cycle inventory of the analyzed process.

Identifier	Streams	Value (2030)	Value (2040)	Unit	GaBi dataset
<b>F</b>	<b>Feedstock</b>				
F1	Carbon dioxide (CO <sub>2</sub> )	3.0	3.0	kg/kg <sub>EO</sub>	<b>Biogenic CO<sub>2</sub></b> : DE: Biogas from biomass mix for bioenergy (2015) + additional electricity demand for CO <sub>2</sub> membrane separation according to literature <b>Fossil CO<sub>2</sub></b> : DE: Carbon Dioxide by-product ethylene oxide (EO) via air (Sphera)
F2	CO <sub>2</sub> recycle stream	13.1	3.03	kg/kg <sub>EO</sub>	Flow: Carbon dioxide [Renewable resources]
F3	Water (H <sub>2</sub> O)	14.1	10.6	kg/kg <sub>EO</sub>	EU-28: Water (desalinated; deionized) ts
F4	Stoichiometric H <sub>2</sub> O Demand	10.6	10.6	kg/kg <sub>EO</sub>	EU-28: Water (desalinated; deionized) ts
<b>A</b>	<b>Auxiliaries</b>				
A1	Electricity	0.35	0.16	GJ/kg <sub>EO</sub>	EU-28: Electricity grid mix (production mix) Sphera EU-28: Electricity from photovoltaic Sphera EU-28: Electricity from wind power Sphera
A2	Steam	0.74	0.74	kg/kg <sub>EO</sub>	EU-28: Process steam from natural gas 90% EU-28: Process steam from biogas 90%
<b>I</b>	<b>Intermediates</b>				
I1	Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> )	6.03	6.03	kg/kg <sub>EO</sub>	Flow: Hydrogen peroxide (100 %) [Inorganic intermediate products]
I2	Ethylene (C <sub>2</sub> H <sub>4</sub> )	0.829	0.829	kg/kg <sub>EO</sub>	Flow: Ethene (ethylene) [Organic intermediate products]
I3		0.637	0.637	kg/kg <sub>EO</sub>	Flow: Ethene (ethylene) [Organic intermediate products]
<b>P</b>	<b>Products</b>				
P1	Ethylene oxide (C <sub>2</sub> H <sub>4</sub> O)	1	1	kg/kg <sub>EO</sub>	Flow: Ethylene oxide [Organic intermediate products]
<b>S</b>	<b>Side-products</b>				
S1	Hydrogen (H <sub>2</sub> )	0.1450	0.1450	kg/kg <sub>EO</sub>	Flow: Hydrogen (high purity) [Inorganic intermediate products]
S2	Methane (CH <sub>4</sub> )	0.1290	0.1290	kg/kg <sub>EO</sub>	Flow: Methane [Organic intermediate products]
S3	Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> )	5.26	5.26	kg/kg <sub>EO</sub>	Flow: Hydrogen peroxide (100 %) [Inorganic intermediate products]
<b>E</b>	<b>Direct emissions</b>				
E1	Ethylene (C <sub>2</sub> H <sub>4</sub> )	0.03158	0.03158	kg/kg <sub>EO</sub>	Flow: Ethene [ecoinvent long-term to air]
E2	Hydrogen (H <sub>2</sub> )	0.00022	0.00022	kg/kg <sub>EO</sub>	Flow: Hydrogen [Inorganic emissions to air]
E3	Methane (CH <sub>4</sub> )	0.00523	0.00523	kg/kg <sub>EO</sub>	Flow: Methane (biotic) [Organic emissions to air (group VOC)]
E4	Carbon dioxide (CO <sub>2</sub> )	0.02984	0.02984	kg/kg <sub>EO</sub>	Flow: Carbon dioxide (biotic) [Inorganic emissions to air]