

# Accepted Manuscript

Environmental impact of CO<sub>2</sub>-expanded fluid extraction technique in microalgae oil acquisition

TsingHai Wang, Chih-Lin Hsu, Chih-Hung Huang, Yi-Kong Hsieh, Chung-Sung Tan, Chu-Fang Wang

PII: S0959-6526(16)31075-7

DOI: [10.1016/j.jclepro.2016.07.179](https://doi.org/10.1016/j.jclepro.2016.07.179)

Reference: JCLP 7751

To appear in: *Journal of Cleaner Production*

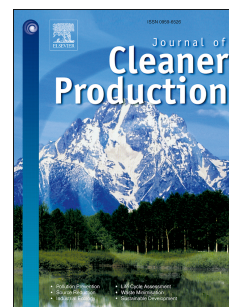
Received Date: 25 February 2016

Revised Date: 10 July 2016

Accepted Date: 26 July 2016

Please cite this article as: Wang T, Hsu C-L, Huang C-H, Hsieh Y-K, Tan C-S, Wang C-F, Environmental impact of CO<sub>2</sub>-expanded fluid extraction technique in microalgae oil acquisition, *Journal of Cleaner Production* (2016), doi: 10.1016/j.jclepro.2016.07.179.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Environmental impact of CO<sub>2</sub>-expanded fluid extraction technique in microalgae oil acquisition

TsingHai Wang,<sup>1\*</sup> Chih-Lin Hsu,<sup>1</sup> Chih-Hung Huang,<sup>2</sup> Yi-Kong Hsieh,<sup>1</sup> Chung-Sung Tan,<sup>2</sup>  
Chu-Fang Wang<sup>1\*</sup>

1. Biomedical Engineering and Environmental Sciences, 2. Department of Chemical Engineering,  
National Tsing Hua University, Hsinchu, Taiwan

### Abstract

Environmental impact of CO<sub>2</sub>-expanded fluid extraction technique in microalgae oil acquisition was quantitatively analyzed using life cycle assessment (LCA) method and compared with other available extraction techniques. It was found that CO<sub>2</sub>-expanded fluid extraction technique exhibited only one-tenth of environmental impact over other extraction methods, particularly on organic respiratory and climate change. Achieved low environmental impact was mainly attributed to the high extraction efficiency that further allows it for operating in mild pressure and shortened period of time, which dramatically decreases the energy consumption and afterwards environmental impacts. Utilizing renewable energy for CO<sub>2</sub>-expanded fluid extraction would further lower its environmental impact by minimizing carbon footprint resulting from electricity generation. Importantly, based on water-energy nexus consideration, the low environmental impact along with low energy consumption of CO<sub>2</sub>-expanded fluid extraction technique arises an opportunity to regard microalgae oil an energy storage vessel in response to the intermittent nature of renewable energy. This would be a new incentive for the development of microalgae oil production.

Keywords: CO<sub>2</sub>-expanded fluid extraction, Microalgae oil, Life cycle assessment, Water-energy nexus, Energy storage vessel

Download English Version:

<https://daneshyari.com/en/article/8100968>

Download Persian Version:

<https://daneshyari.com/article/8100968>

[Daneshyari.com](https://daneshyari.com)