

Call for Papers for a Special Issue: **Life Cycle-based Assessment Methods for Circular Economy Strategies in the Agri-food Sector**



Special Issue Scope

Circular Economy (CE) strategies have become of relevant interest in the public and business agendas, with the aim of overcoming the current take-make-waste model focused on linear systems (Korhonen et al. 2018). According to Bocken et al. (2016), the core of the CE concept refers to three strategies: closing loops (recycling), narrowing loops (increasing resource efficiency) and slowing loops (extending product life). Among the scientific international literature, different studies have so far proposed and evaluated the implementation of CE strategies at different levels (macro, meso and micro), focusing on products, companies, networks between industries, cities, and nations (Ghisellini et al. 2016). Despite this, the measurement of CE related impacts and the necessity of developing and applying dedicated CE indicators, or adapting existing tools and methods, as well as the evaluation of sustainability implications, are still contested issues (Elia et al. 2017; Sassanelli et al. 2019; Blum et al. 2020). At the same time, there is no unified definition on what the CE concept means (Kirchherr et al. 2017).

The agri-food sector is considered as one of the main challenges related to the achievement and application of CE strategies (Muscio and Sisto 2020). This sector is indeed causing an unsustainable use of resource and production of waste, that result in environmental, economic, and social impacts, if the whole supply chain from agricultural processes to consumers is considered. Despite this, the agri-food sector may represent an important opportunity for the implementation of the CE concept. For example, proposing suitable actions for food waste treatment (e.g., anaerobic digestion or bioconversion by insects) would allow both the improvement of the environmental, economic, and social performance of the entire agri-food sector, and the opportunity of implementing CE strategies through the valorisation of the embodied value of the food wasted (Mondello et al. 2017; Salomone et al. 2017; Tonini et al. 2020). In addition, the added value related to the optimisation and reduction of the resources used in the agricultural and production processes should be evaluated not only in terms of sustainability improvement, but also focusing on CE strategies.

One of the intrinsic characteristics of the agri-food sector is that it includes activities that involve other industrial sectors, such as the packaging and the energy ones. In fact, agri-food supply chain could be defined as a syneresis of different economic activities some of which are natural processes managed by anthropic actions while others are industrial processes, fully under human control (Gulisano et al. 2018). This makes the implementation of CE strategies in the agri-food sector particularly challenging, as it is necessary to act simultaneously on the circularisation of business models involving both biological and technical components (The Ellen MacArthur Foundation 2013). Implementing CE strategies for the packaging sector, and, in particular, for the food packaging, has become an issue of crucial importance, due to its challenges such as chemical safety aspects and recycling technologies (Geueke et al. 2018; Jang et al. 2020). Furthermore, according to Kiviranta et al. (2020), CE may allow to improve the value of energy systems, specifically, when renewable energy is obtained by waste materials. This concept could be also extended to the energy value included in food waste, which could be considered as a valuable resource, promising opportunities for the implementation of CE strategies. However, it is fundamental to understand what the best way is for assessing

the impacts or benefits caused by such strategies. As pointed out by Moraga et al. (2019), different literature review's studies highlighted the importance of analysing CE following a life cycle perspective. In this context, the Life Cycle Thinking (LCT) may be considered as a "very well suited" approach for supporting the implementation and assessment of sustainability implication of CE (Peña et al. 2021). In particular, the LCT related methods, such as, Life Cycle Assessment (LCA), Organisational LCA (OLCA), Life Cycle Costing (LCC), Social LCA (SLCA) and Life Cycle Sustainability Assessment (LCSA), would allow obtaining a detailed picture on the sustainability performance of CE strategies, focusing on the environmental, economic, and social impacts. The usefulness of such methods for assessing CE, as well as the possibility of their integration with dedicated CE indicators has been highlighted by several authors (e.g., Haupt and Zschokke 2017; Niero and Kalbar 2019; Roos Lindgreen et al. 2020). In addition, Peña et al. (2021) evaluated potentialities and weakness of the LCA and related approaches to be applied for measuring CE strategies, highlighting that LCA and related methodologies may allow to evaluate and achieve more consistent CE strategies, but, at same time, the authors suggested that further development are required for better linking LCA and CE.

The aim of the Special Issue (SI) here presented is to collect high quality original-papers and review-papers focused on the methodological and practical assessment of CE strategies in the agri-food and related sectors (packaging and energy) by means of LCT related methods. Authors are also encouraged to propose approaches in which LCT methods and dedicated CE indicators are integrated in order to provide a comprehensive sustainability assessment of CE strategies. Therefore, proposed papers should promote, evaluate, and understand the role of LCT methods in supporting and measuring the sustainability of CE strategies by focusing on one (or more) of the three area of interest here presented:

- 1) agri-food sector and related activities (e.g., agricultural processes, food production, food storage and transportation, food consumption and services, food waste production and treatment, etc.), assessing resource use optimisation and/or waste reduction or treatment in a CE perspective;
- 2) food packaging and related processes (e.g., raw material extraction, industrial production, reuse activities, post-consumer waste management, etc.) in relation to the implementation of different CE strategies;
- 3) energy related to the agri-food sector, focusing, for example, on CE strategies based on the improvement of energy systems (e.g., energy sources for agricultural machineries, food transformation, food storage and refrigeration, etc.) or the assessment of the embodied energy of food waste products.

Within the aim of *The International Journal of Life Cycle Assessment*, this SI will firstly allow to collect detailed data and information related to the usefulness and suitability of LCT related methods for assessing CE strategies at product, company, or service level. The analysis and their results will be oriented on a selection of very important sectors in terms of environmental, economic, and social implications, and intrinsic potential for CE implementation, as the agri-food and related packaging and energy ones. Secondly, focusing on a CE perspective, this SI will allow to highlight important methodological aspects related to the added value and peculiarities of the LCT methods when combined among themselves or with dedicated CE indicators. Lastly, the collected studies may represent a guide and reference for policymakers and companies, as well as for the scientific community, that want to promote, evaluate, or apply CE strategies and in the meantime understand their impacts and sustainability implications.

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How to submit:

Manuscripts should be original and written in English. The suggested length per article is up to 10,000 words, excluding references. Submission requires that the manuscript has not been submitted for review or publication elsewhere and that it will not be submitted elsewhere while the review process is underway. All papers go through peer-review by at least two experts: with regard to this point, at the time of submission, authors will be asked to suggest a number of reviewers' names.

Papers should be submitted online via <https://www.editorialmanager.com/jlca/default.aspx>. Please indicate that your manuscript belongs to the "LCA-based Methods for CE Strategies in Agri-food Sector" special issue in the 'Additional Information' tab during the submission process. Details about the preparation of the manuscript can be obtained from the journal's webpage at <https://www.springer.com/journal/11367/submission-guidelines>.

Timeline:

March 9, 2021: Call for Papers issued

December 15, 2021: Final Submission Deadline

2022: Publication of Special Issue