

Living Sustainability: In-Context Interactive Life Cycle Analysis

Life cycle analysis is crucial to understanding the impact of services, products and processes on carbon emissions. Living Sustainability is a tool aimed at making these analyses more accessible, by generating life cycle analyses and generating environmental impact visualizations from raw text at the click of a button.

What is the Problem?

In a world increasingly dominated by environmental concerns related to global carbon emissions, life cycle analysis (LCA) is a critical tool used to quantify the environmental impact of a single object or service. By going step by step through the raw materials, manufacturing, transportation, and use case, and LCA expert can accurately summarize the total carbon emissions of things from a coffee cup to a highly complex piece of technology.

However, such analysis takes significant effort from an LCA expert. This makes LCA challenging to implement or understand for the average person who is not fluent in this type of analysis, either in terms of using it or reading the results. Given the accelerating capabilities of natural language processing (NLP) and the availability of LCA databases with the information needed to conduct such an analysis, there is a need to bridge this gap between the public and the life cycle of the products and services they use in everyday life.

What is the Solution?

Living Sustainability is an autonomous system that can be implemented in a web browser to provide interactive, in context environmental impact visualization from raw text. Through a four stage process, an estimated LCA can be generated on-demand to show the emissions of a product or process with sufficient information given. The model first extracts the key LCA parameters from the text through natural language processing, then transforms the data into a format that authenticated LCA databases and online sources can read. The tool retrieves the necessary data and emission factors and conducts an LCA, showing an embedded visualization.

What is the Competitive Advantage?

The major strengths of Living Sustainability are its potential for time savings, accuracy, and perpetuating awareness of environmental impacts through accessibility. A life cycle analysis, using this tool, can be shortened from hours of expert review to a single click by a user. The tool has been demonstrated to successfully transform >97% of the natural language into a data-base-friendly format and achieve LCA results within 10% of a full analysis. Integrated as a web

Technology ID

BDP 9151

Category

Software/Other
Selection of Available
Technologies

Authors

Vikram Subramaniam Iyer

[View online](#)



extension, this tool becomes easily usable for the everyday person. As most of the participants testing this software did not think about emissions in their everyday lives, the accessibility of this tool provides a massive opportunity to increase public consciousness about carbon emissions on any scale. Based on the projected impact of the tool on carbon savings from its users, it can even run up to 20,000 queries per user annually while still remaining carbon neutral.

References

1. Zhihan Zhang, Puvarin Thavikulwat, Alexander Le Metzger, Yuxuan Mei, Felix Hähnlein, Zachary Englhardt, Gregory D. Abowd, Shwetak Patel, Adriana Schulz, Tingyu Cheng, Vikram Iyer(45903) , <https://dl.acm.org/doi/abs/10.1145/3749488>, <https://dl.acm.org/toc/imwut/2025/9/3>, 9, 3, Article 153, 15342