




# Brightway: An open source framework for Life Cycle Assessment

Chris Mutel<sup>1</sup>

<sup>1</sup> Paul Scherrer Institut

DOI: [10.21105/joss.00236](https://doi.org/10.21105/joss.00236)

## Software

- [Review](#) 
- [Repository](#) 
- [Archive](#) 

## Licence

Authors of JOSS papers retain copyright and release the work under a Creative Commons Attribution 4.0 International License (CC-BY).

## Summary

Brightway is an open source framework for Life Cycle Assessment (LCA) calculations in Python. The combination of a modular structure, the expressiveness and interactivity of Python and in particular Jupyter notebooks, and tuned calculation pathways allows for new research directions in Life Cycle Assessment. Brightway has been used in papers on meta-analysis of many inventory datasets (Wernet et al. 2011), regionalized LCA (Mutel, Pfister, and Hellweg 2011), and sensitivity analysis (Mutel, Baan, and Hellweg 2013). Brightway consists of three main modules: Brightway2-data (Mutel 2012c) manages how data is stored and accessed; Brightway2-calc (Mutel 2012b) does static and Monte Carlo calculations; and Brightway2-IO (Mutel 2015c) handles the import and export of LCA data from various sources. In addition to these libraries, helper libraries provide documentation and application examples (Mutel 2012a), support for parameterized inventories (Mutel 2015b), and a format for LCA data in arrays (Mutel 2013). A web page (Mutel 2016), documentation (Mutel 2015a), and a development blog (Mutel 2014) are also available.

## References

- Mutel, Christopher. 2012a. “Brightway2.” <https://bitbucket.org/cmutel/brightway2>.
- . 2012b. “Brightway2-Calc.” <https://bitbucket.org/cmutel/brightway2-calc>.
- . 2012c. “Brightway2-Data.” <https://bitbucket.org/cmutel/brightway2-data>.
- . 2013. “Stats-Arrays.” [https://bitbucket.org/cmutel/stats\\_arrays](https://bitbucket.org/cmutel/stats_arrays).
- . 2014. “Brightway2 Development Blog.” <https://chris.mutel.org/>.
- . 2015a. “Brightway Documentation.” <https://docs.brightwaylca.org/>.
- . 2015b. “Brightway2-Analyzer.” <https://bitbucket.org/cmutel/brightway2-parameters>.
- . 2015c. “Brightway2-Io.” <https://bitbucket.org/cmutel/brightway2-io>.
- . 2016. “Brightway2-Data.” <https://brightwaylca.org/>.
- Mutel, Christopher L, Laura de Baan, and Stefanie Hellweg. 2013. “Two-Step Sensitivity Testing of Parametrized and Regionalized Life Cycle Assessments: Methodology and Case Study.” *Environmental Science & Technology* 47 (11). American Chemical Society: 5660–7. doi:10.1021/es3050949.
- Mutel, Christopher L, Stephan Pfister, and Stefanie Hellweg. 2011. “GIS-Based Regionalized Life Cycle Assessment: How Big Is Small Enough? Methodology and Case Study of

Electricity Generation.” *Environmental Science & Technology* 46 (2). ACS Publications: 1096–1103. doi:10.1021/es203117z.

Wernet, Gregor, Christopher Mutel, Stefanie Hellweg, and Konrad Hungerbühler. 2011. “The Environmental Importance of Energy Use in Chemical Production.” *Journal of Industrial Ecology* 15 (1). Wiley Online Library: 96–107. doi:10.1111/j.1530-9290.2010.00294.x.