RESEARCH GROUP

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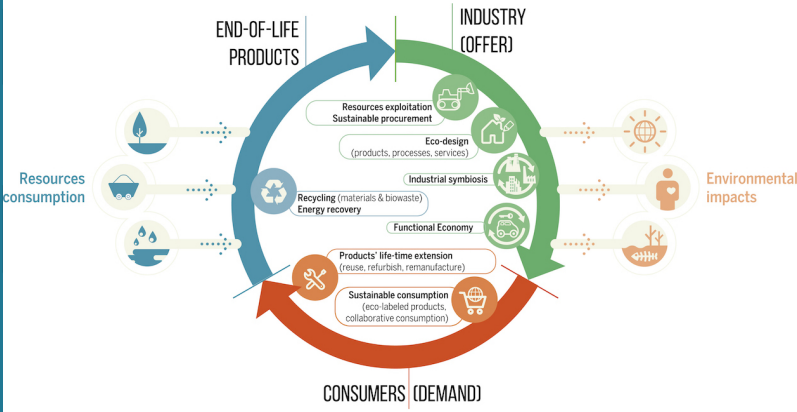
Life Cycle Sustainability Analysis



The activities conducted within the Life Cycle Sustainability Analysis group mainly consist in the development and application of methods, metrics and tools to assess the sustainability performance of products, technologies and policies for both industrial organisations and policy makers.

MAIN COMPETENCES

Life Cycle Assessment (LCA) is a core expertise of the research group. Depending on the decision-making context, its researchers apply different types of LCA methodologies: attributional, consequential, input-output, or hybrid.
Besides of LCA, the group also applies its skills and experience from other expertise fields:

- Circular Economy approaches and best practices (e.g. eco-design, industrial symbiosis, remanufacturing, recycling)
- Eco-system services valuation
- Material Flow Analysis (MFA)
- Mathematical and resource optimisation methods
- Agent-Based Modelling (ABM)
- Life-Cycle Costing (LCC)

When needed, those expertise fields can be coupled to LCA methodologies to reinforce the modellings and the accuracy of the results. Moreover, the researchers' programming skills (e.g. in Python programming language) enable the group to develop customised computational models for its partners.

Main Assets

- ECOPACT: simplified LCA tool to support eco-design projects in SMEs
- OASIS: trade off optimal solutions (i.e. environment and cost) for drinking water production
- DAEDALUS: decision-making regarding buildings refurbishment at urban scale for energy efficiency
- OptiHEAT: generate optimal waste heat recovery solutions within complex systems
- VALUES: provide more robust indicators for the assessment of land use on ecosystem services
- MUSA: decision-making (environment and cost) for local farming practices
- DyPLCA: provide more accurate and realistic LCA results considering dynamic inventories

SELECTED PUBLICATIONS

- Cost versus life cycle assessment-based environmental impact optimization of drinking water production plants, Capitanescu F., Rege S., Marvuglia A., Benetto E., Ahmadi A., Navarrete Gutiérrez T., Tiruta-Barna L. (2016), Journal of Environmental Management 177: 278-287;
- Geospatial characterization of building material stocks for the Life Cycle Assessment of end-of-life scenarios at the urban scale, Mastrucci A., Marvuglia A., Popovici E., Leopold U., Benetto E. (2016), Resources, Conservation & Recycling 123: 54–66;
- Waste heat valorisation at multiple scales: focus on inbuilding waste water and regional heat recovery, Bertrand A. (2017), PhD thesis;
- Assessment of Life Cycle Impacts on Ecosystem Services: Promise, Problems, and Prospects, Othoniel B., Rugani B., Heijungs R., Benetto E., Withagen C. (2016), Environmental Science & Technology 50 (3), 1077-1092;
- A return on experience from the application of Agent-Based Simulations coupled with Life Cycle Assessment to model agricultural processes, Marvuglia A., Rege S., Navarrete Gutiérrez T., Vanni L., Stilmant D., Benetto E. (2017), Journal of Cleaner Production 142(4): 1539–1551;

Partners

ArcelorMittal, Astron, Cimalux , Delphi, SCORELCA , Ministry of the Economy, Ministry of Sustainable Development and Infrastructure, Tarkett, Voestalpine.

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