

**PhD Position on
Opportunities of using data of analytical accounting at organisational level
to enable Life Cycle Assessment at product level:
Application to the decarbonization of industrial processes**

Profile

The research group of the University of Bordeaux CyVi on life cycle assessment and sustainable chemistry at the Institute of Molecular Sciences, and the chair on human capital and global performance at the Institute for Research in Management of Organizations (IRGO), are opening a doctoral position on the subject of the opportunities of using data of analytical accounting at organisational level to enable Life Cycle Assessment at product level. The approach developed is to be applied to the decarbonization of industrial processes. This position has got funding from the PEPR SPLEEN programme that aims to implement structuring research in France to transform industrial processes to make them less greenhouse gas-emitting, in line with the priorities defined as part of the national “decarbonisation of industry” acceleration strategy for France 2030.

Since its creation in 2012 the CyVi Group has got an inter- and transdisciplinary orientation to advance metrics for environmental and societal transitions necessary for sustainable development. The group of scientists has been carrying out case studies in multiple economic sectors. The objectives of the research carried out within the CyVi group are to apply and develop methodologies for assessing environmental impacts and the use of natural resources, in particular life cycle assessment (LCA). See <http://www.ism.u-bordeaux.fr> and <http://cyvigroup.org/> for more information.

The IRGO (Research Institute in Organizational Management) is the research unit (EA 4190) in Management Sciences at the University of Bordeaux. This laboratory is one of the main French research centres in organisational management science and makes a significant contribution to major contemporary management, accounting and in particular Corporate Social Responsibility (CSR) issues. See <https://ecor.u-bordeaux.fr/unites-de-recherche/irgo-institut-recherche-gestion-organisations-ur-4190> for more information.

A collaboration between chairholders of the institutes has been established for several years. A first PhD thesis was devoted to the life cycle assessment and the societal accounting of wine properties. Currently a second PhD study is ongoing on establishing a systematic methodology to convert accounting data into comprehensive environmental impact assessments. The primary workplace will be the Bordeaux campus, with the candidate spending approximately two-thirds of their time at ISM and the remaining one-third at the IRGO group, both at the University of Bordeaux. Option of exchanges might come up with long standing collaboration partners such as the University of Augsburg in Germany and the University of Waterloo in Canada. The Bordeaux campus in Talence is easily accessible with public transportation.

Starting date: 1 October 2024 or later, mandatory start before the end of 2024

Requirements

- Should hold a master’s degree in management or economics sciences, in particular sustainable resource management, or chemical or engineering sciences, in particular in chemical engineering.
- If coming from chemical or engineering sciences, should have a basic culture and interest in management and accounting and if coming from management or economics sciences, should have a basic culture and interest in chemical engineering and sustainability assessment
- Experience in life cycle (sustainability) assessment, material flow analysis, analytical accounting, greenhouse gas accounting, environmental management accounting, supply chain management, industrial processes, stakeholder outreach, social acceptance.

- Interest in **interdisciplinary high-level research**, focusing on sustainability science by accounting monetary, greenhouse gases and resource flows for the environmental transition.
- Enthusiasm for collaborating within research groups on sustainability assessment of the energy transition using life cycle approaches, including the possibility to contribute to the supervision of Master and Bachelor students.
- Willingness to contribute to the management tasks of the project funding the PhD thesis and to general duties within the research groups.
- Proficiency in **programming languages such as Python**, and other informatic skills
- Rigor, organization and analytical sense as well as autonomy, team communication skills and capacity for cooperation are important.
- Excellent knowledge of **English and if possible, also of French** are required.

Project context and description of the PhD thesis

This thesis project aims to contribute to facilitating, through the transformation of information systems, the achievement of carbon neutrality by 2050. This is an ambitious objective, which will indeed require a profound overhaul of information, and a new integration of methods carried out until now in a distinct way. We thus note on the one hand, a recording of accounting data coming under a logic of financial flows, and on the other hand, the possibility of an analysis of physical flows, based on the approaches developed by the scientific community of life cycle assessment. We look for the opportunities of using data of analytical accounting at organisational level to enable Life Cycle Assessment (LCA) at product level. The approach developed is to be applied to the decarbonization of industrial processes.

That means the objective of the thesis will be precisely, from one or more case studies, the implementation of the decarbonization of industrial processes, by setting up such an automated system, for the integration of analytical accounting data into the process of calculation of environmental impacts, at least carbon and water footprints, and this, by allowing reliable information in real time, and distributed to all managers of analytical centres.

Beyond the demonstration of the operational feasibility of such an integration done in the ongoing PhD study, the development of the use this accounting data at organisational level for product level LCA will have two complementary objectives:

- a) Implement a generalizable model in the context of industrial processes with a high environmental impact focusing on carbon and water footprint and aiming at enabling real-time dynamic LCA,
- b) Propose accounting that is not only descriptive but also with predictive functionalities, making it possible to anticipate the capacity to reduce negative environmental externalities, especially for the decarbonization of industrial processes.

The work will make it possible to move forward on four methodological/ technological challenges of great originality in research:

1. The reconciliation of accounting data (monetary) and physical data (necessary for the calculation of environmental impacts) internal to the company for the innovation of products
2. Obtaining reliable data from suppliers for organisational reporting (external/ scope 3 greenhouse gas emissions/ organisational LCA) and use them for product LCA studies
3. Real-time accounting calculation for economic and environmental performance
4. Prediction and anticipation of environmental impacts, in particular of carbon and water footprints, for eco-design purposes

At the end of their doctoral work, the candidate will have acquired a sought-after skill in management tools, accounting, life cycle assessment, decarbonization of processes and programming, allowing them to be one of the leading experts and pursue a career in research and teaching, consultancy or in industry or administration in favour of the ecological transition and orientated towards the carbon neutrality by 2050.

Funding: The LCA-SPLEEN project (*Life Cycle Assessment based metrics for industry and research to support industrial processes decarbonization while minimizing environmental impacts*) is funded by France 2030 and operated by the French National Research Agency (ANR) as part of the Priority Research and Equipment Program (PEPR) on supporting the decarbonisation of French industry and the development of national industrial sectors for decarbonisation solutions. This is a fundamental challenge, given that industry is responsible for around 20% of France's greenhouse gas (GHG) emissions. The National Low Carbon Strategy aims to reduce industrial greenhouse gas emissions by 35% by 2030 and 81% by 2050, compared with 2015 levels.

Duration of the thesis: 3 years

Length of employment: max. until the end of 2027

PhD Thesis co-director: Prof. G. Sonnemann, ISM, Univ. Bordeaux

PhD Thesis co-director: Prof. S. Trebucq, IGRO, Univ. Bordeaux

Application

Deadline for application: **21 June 2024** at noon

Interested and highly motivated candidates are invited to submit their electronic application documents (cover letter, CV, and up to 2 potential references with address, telephone number and e-mail in electronic form in a pdf file) by e-mail before the end of the deadline at:

- Thesis co-director: Guido Sonnemann, Professor of sustainable chemistry, head of the CyVi group (Life Cycle Analysis and Sustainable Chemistry), ISM, University of Bordeaux
Email: guido.sonnemann@u-bordeaux.fr
- Thesis co-director: Stéphane Trébuq, Professor of Management Sciences, holder of the chair on human capital and global performance, member of the IRGO and IAE, University of Bordeaux
Email: stephane.trebucq@u-bordeaux.fr

References

- Colwyn Jones, T., & Dugdale, D.: The ABC bandwagon and the juggernaut of modernity. *Accounting, Organizations and Society*, 27(1), 121–163, 2002
- Emblemsvåg, J.: Activity-based life-cycle costing. *Managerial Auditing Journal*, 16(1), 17–27, 2001
- Greenhouse Gas Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Supplement to the GHG Protocol Corporate Accounting and Reporting Standard. World Resources Institute and World Business Council for Sustainable Development, Geneva, 2011
- Finkbeiner M. & Bach V.: Life cycle assessment of decarbonization options—towards scientifically robust carbon neutrality. *The International Journal of Life Cycle Assessment*, 26, 635–639, 2021
- Hauschild, M.Z., Rosenbaum, R.K., Olsen, S.I. (Eds): *Life Cycle Assessment: Theory and Practice*. Springer International Publishing, Dordrecht, The Netherlands, 2017
- ISO 14040: Life Cycle Assessment — Principles and framework. International Organization for Standardization, Geneva, Switzerland, 2006
- ISO 14044: Life cycle assessment— Requirements and guidelines. International Organization for Standardization, Geneva, Switzerland, 2006
- ISO 14072: Life Cycle Assessment — Requirements and guidelines for Organizational Life Cycle Assessment. International Organization for Standardization, Geneva, 2014
- Jourdaine M.: Mise en place d'une comptabilité analytique environnementale mobilisant l'analyse du cycle de vie (ACV) et l'activity-based costing (ABC) : application au cas viti-vinicole. Université de Bordeaux, Gestion et management, 2020.
- Jourdaine, M., Loubet, P., Sonnemann, G., & Trébuq, S.: The ABC-LCA method for the integration of activity-based costing and life cycle assessment. *Business Strategy and the Environment*, 30(4), 1735-1750, 2021
- Sonnemann G., Tsang M., Schuhmacher M. (Eds): *Integrated Life-Cycle and Risk Assessment of Industrial Processes and Products*, Series: Advanced Methods in Resource & Waste Management. CRC Press, Boca Raton, FL, 2018
- The Shift Project: *Décarboner la Chimie Française*, Paris, 2022
- WBSCD: Value Chain Carbon Transparency Pathfinder Enabling decarbonization through Scope 3 emissions transparency. World Business Council for Sustainable Development, Geneva, 2021
- Yang, C.-H., Lee, K.-C., & Chen, H.-C.: Incorporating carbon footprint with activity-based costing constraints into sustainable public transport infrastructure project decisions. *Journal of Cleaner Production*, 133, 1154–1166, 2016