FACULTY OF BIOSCIENCE ENGINEERING

The Chancellor of Ghent University has the honour of inviting you to attend the public defense of the doctoral dissertation of

(ir.) Sergio Garmendia-Lemus

Title of the doctoral dissertation:

Bio-Based Fertilisers in the EU:
Adoption, Techno-Economic Viability, and Policy Implications of Circular Nutrients Recovery

The public defence will take place on 30th of January at 14:00 hours in the Auditorium E4 at Campus Coupure. Coupure Links 653, 9000 Ghent.

There will be a contiguous reception to which you are heartily invited at the Biosphere at Campus Coupure. Please confirm your attendance before 24/01/2026 in the following form and/or sergio.garmendialemus@ugent.be (WA: +32478667996).

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GHENT UNIVERSITY

Abstract of the doctoral research

Bio-based fertilisers (BBFs) support the European Union's objectives for circularity, reduced dependence on finite resources, and more sustainable nutrient use. Products derived from organic waste such as struvite, biochar, and ash-based fertilisers can achieve agronomic performance comparable to conventional fertilisers while reducing environmental impacts. Despite this potential, their widespread adoption remains limited due to regulatory complexity, market uncertainty, and technological and logistical constraints. This dissertation examines the conditions required to integrate BBFs into established and competitive nutrient markets through a multidisciplinary approach. By combining behavioural analysis, techno-economic assessment, and spatial and policy modelling, it demonstrates that farmer adoption is shaped not only by economic considerations but also by environmental perceptions and social influences. Although nutrient recovery technologies can be economically viable under specific conditions, coordinated technological innovation, supportive policy frameworks, and targeted market incentives are essential to scaling circular fertilisation practices across Europe.

Brief Curriculum Vitae

Sergio Garmendia Lemus is an energy and sustainability specialist with nine years of professional experience in research and consultancy across academia and industry. He holds a Bachelor's degree in Environmental Engineering from the Western Institute of Technology and Higher Education (ITESO), Mexico (2015), and a Master of Science in Energy and Environmental Sciences from the University of Groningen, the Netherlands (2019).

His expertise lies in developing financial models that support the transition to a circular economy and the deployment of sustainable technologies. Passionate about bridging science and practice, he seeks to drive innovation, business and societal development across the energy, water, waste, carbon, and environmental sectors. Sergio has collaborated with multiple organizations and research networks, including EU-funded projects, and has contributed to consultancy and research on climate change, carbon markets, environmental and social economics. His academic work has been published in international peer-reviewed journals and presented at international conferences.