

A SEMINAR

Topic: CRITICAL MINERALS FOR ENERGY AND ECONOMIC DEVELOPMENT

Speaker:



Prof. Valerie Thomas

Date:

Tuesday, 18th March
2025

Time:

14:30 to 15:30 Kigali
time

Venue:

ACE-ESD Boardroom

Elements considered critical to the development of new energy technologies include tantalum, cobalt, lithium, and rare earth elements. Techniques including material flow analysis, life cycle assessment, and techno-economic analysis can provide insights into the opportunities and challenges of recovery and utilization. Material flow analysis will be used to examine the sources, utilization, and recycling of several critical minerals. This analysis will illustrate how this methodology can be applied to other material and energy systems. Life cycle assessment analyses the environmental impacts of a product; this methodology can be used to evaluate overall and combined impacts of products that use critical minerals, allowing consideration of impacts from mining, manufacturing, use, and recycling on a consistent basis. This methodology will be introduced for practical application using the GREET model, which contains information on critical minerals in an accessible, open-source format. Techno-economic analysis is cost analysis of technologies and is broadly used in the evaluation of new technologies to evaluate readiness for market. The methodology will be illustrated with a preliminary assessment of refining of critical minerals.

The talk builds on previous publications, as follows:

Can Şener, S.; Thomas, V. M.; Hogan, D.; Maier, R.; Carbajales-Dale, M.; Barton, M.; Karanfil, T.; Crittenden, J.; Amy, G. Recovery Potential of Critical Minerals and Metals from Aqueous Sources. *ACS Sustainable Chemistry & Engineering* **9** (35): 11616–11634, 2021.
Imasiku, K. and Thomas, V. M. The Mining and Technology Industries as Catalysts for Sustainable Energy Development. *Sustainability* **24** (12) 10410, 2020. <https://doi.org/10.3390/su122410410>



BIOGRAPHY:



Prof. Valerie Thomas

Prof. Valerie Thomas is the Anderson-Interface Chair of Natural Systems and Professor in the H. Milton School of Industrial and Systems Engineering, with a joint appointment in the School of Public Policy. Dr. Thomas's research interests are energy and materials efficiency, sustainability, industrial ecology, technology assessment, international security, and science and technology policy. Current research projects include low carbon transportation fuels, carbon capture, building construction, and electricity system development. Dr. Thomas is a Fellow of the American Association for the Advancement of Science, and of the American Physical Society. She has been an American Physical Society Congressional Science Fellow, a Member of the U.S. EPA Science Advisory Board, and a Member of the USDA/DOE Biomass Research and Development Technical Advisory Committee. She has worked at Princeton University in the Princeton Environmental Institute and in the Center for Energy and Environmental Studies, and at Carnegie Mellon University in the Department of Engineering and Public Policy.