Fakultät Umweltwissenschaften, Fachrichtung Hydrowissenschaften, Institut für Abfall- und Kreislaufwirtschaft

Topic for project work, bachelor's thesis, and master's thesis for students in the field of environmental sciences, waste and resource management, and Environmental engineering

Topic: Investigation of Weighting Methodologies for Semiconductor Life Cycle Indicators within the EU Green Deal Framework: Weighting the Environmental Indicators for Combined Sustainability Assessment in requirements write the specific requirements.

Start: As soon as possible.

Background:

In times of accelerating technological growth, the semiconductor industry has become one of the most resource- and energy-intensive manufacturing sectors. While electronic components are optimized for high performance during their use phase, their manufacturing stage carries heavy environmental trade-offs. As Europe ramps up domestic microchips production via the EU Chips Act, new fabrication facilities must comply with the strict environmental mandates of the EU Green Deal. However, evaluating a microchip's true environmental footprint is heavily restricted by the "apples and oranges" problem: Life Cycle Assessment (LCA) data yields completely different physical units (such as kilograms of carbon dioxide vs. human toxicity points) that cannot be easily added together. To advance circular value creation and sustainable hardware design, we must investigate how these diverse indicators can be normalized and how to establish a balanced value system by weighting the environmental indicators within a unified European context.

Tasks:

Project work or Thesis: Interview- and policy-based investigation of environmental indicator weighting schemes, establishing a mathematically sound data-aggregation pipeline to combine multiple environmental impacts into a single, common European Environmental Performance Factor.

Requirements:

- Strong affinity for data evaluation and quantitative modeling. Comfort with Multi-Criteria Decision Analysis (MCDA) methodologies or a willingness to quickly master matrix-based scaling and weighting systems.
- Solid hands-on experience with spreadsheet tools (Microsoft Excel) for structured data analysis, algebraic modeling, and comparative matrix calculations
- Strong communication and qualitative research abilities to design, execute, and evaluate structured surveys or interviews with environmental engineering experts.

Supervisor: M. Sc. Harshali Shankar Yeram

Kontakt: Harshali_shankar.yeram@tu-dresden.de