



### Call for a master's thesis

## A STRUCTURAL DECOMPOSITION TO EXAMINE RESOURCE EFFICIENCY VARIATION

**Background.** Resource efficiency (RE) is a central subject in environmental science, engineering and policy making and is implemented in various strategic concepts and agendas such as circular economy, cascading utilization of resources, bioeconomy, and the SDGs. On an economy-wide scale, RE is frequently defined as the monetary benefit (e.g. GDP) a unit of resource use generates. Studies have shown that high GDP growth rates do not necessarily imply high growth in direct material use. However, taking indirect material use into account, resource coupling with GDP was found to be persistent, which indicates unsatisfactory progress towards RE. The finding highlights the need to identify and study sources of inefficiency that undermine the societal efforts in improving RE.

**Objectives.** The thesis estimates to which extent different economic domains (e.g. final demand levels and composition of governments and households, investments, technology development, and the material intensity of primary sectors) have driven decoupling and recoupling of monetary benefit with direct and indirect uses of biomass, fossil resources and minerals. To this end, structural decomposition analyses (SDA) will be conducted based on multi-regional input-output data [1]. The spatial and temporal scope is to be determined. Together with a comprehensive limitations section, the findings will contribute to a more profound understanding of RE dynamics on an economy-wide scale.

### Requirements

- Enrolled in the Environmental System Sciences master program
- Basic knowledge in a suitable computing environment (e.g. MATLAB, R ...)
- Basic knowledge in input-output analysis is an advantage

**Further Information.** The thesis will be supervised by Prof. Tobias Stern (SIS) and co-supervised by Raphael Asada (SIS). Possible languages are English and German. If interested, please contact [raphael.asada@uni-graz.at](mailto:raphael.asada@uni-graz.at) until 2 March 2019.

### References

- [1] Pothén, F., 2017. A structural decomposition of global Raw Material Consumption. *Ecological Economics* 141, 154–165. 10.1016/j.ecolecon.2017.05.032.