

Call for a master's thesis

A STRUCTURAL DECOMPOSITION TO EXAMINE VARIATION IN RESOURCE EFFICIENCY



Background. Resource efficiency (RE) is a central subject in environmental science, engineering and policy making and is implemented in various policies and strategic concepts 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 (material footprints) into account, resource coupling with GDP was found to be persistent, which indicates unsatisfactory progress towards RE. Current research highlights the need to identify and study obstacles that undermine societal efforts in improving RE.

Objectives. The thesis work estimates to which extent different economic domains (e.g. final demand of governments and households, investments, technology development, and the material intensity of primary sectors) have contributed to 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 results comprehensively show how different domestic and foreign economic domains influence the resource efficiency of the countries under study. The results can be used to identify economic activities that obstruct the effectiveness of RE policies.

Requirements

- Enrolled in the Environmental System Sciences master program
- Basic knowledge in a suitable computing environment (e.g. MATLAB, R, Python ...)
- 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 you are interested in the topic, please contact raphael.asada@uni-graz.at until 31 January 2021.

References

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