Master Thesis

Development of an upstream footprint screening-tool for corporations

Between 10% and 70% of the total global social and environmental impacts occur somewhere else to the consumption, i.e. upstream in the value chain. Corporations tremendously struggle in roughly estimating and quantifying these impacts in detail. Scientists have developed various methods of global multi-regional input-output (GMRIO) modelling over recent years to quantify these impacts. However, the applications of these methods in the corporate environment is not straight forward.

Although first steps towards efficiently estimating upstream environmental and social impacts have been made, the **research objective** to be fulfilled in this Master Thesis is threefold:

1) develop a flexible upstream footprint, consumption-based accounting screening-tool for corporations using total impact multipliers (TIMs),
2) develop for four indicator a footprint heatmap, identify and analyse the footprint hotspots by scopes, country and industry-sector
3) compare the performance of one selected company (based on a previous Master Thesis & Lundie *et al*, 2019) with the developed heatmap.

Aiming to provide an answer to this task, the Master Thesis may be structured into the following areas:

(1) Literature research: Research, analysis and evaluation of relevant value chain / scope 3 data, indicators and tools in the context of quantitative sustainability assessment.

(2) Development of tool design concept under consideration of

   a. available input-output data, i.e. TIMs,
   b. relevant indicators, i.e. CO2-eq., water withdrawal, P and wages & salaries in 140 countries and 57 sectors,
   c. data input interface for corporate expenditure data,
   d. quantitative analysis features
      i. by scope 1, 2 and 2,
      ii. by sector and

iii. by countries

iv. comparisons of corporations versus industry sectors and whole of industry performance

e. graphical visualisation.

(3) Development of the upstream footprint screening-tool for industry-sector benchmarking and analysis of corporations by addressing the functionality as described under (2)

(4) Generation of the footprint heatmaps for four indicators including the identification and analysis the footprint hotspots by scopes, country and industry-sector

(5) Comparison of the corporate performance based on available data with the generated **footprint heatmaps** for the indicators CO2-eq. and water withdrawal

Start: asap

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Literature

- Thomas Wiedmann & Manfred Lenzen (2018) Environmental and social footprints of international trade. In: nature geoscience. https:/doi.org/10.1038/s41561-018-0113-9
- Mo Li, Thomas Wiedmann and Michalis Hadjikakou (2019)
- Sven Lundie, Thomas Wiedmann, Melanie Welzel, Timo Busch (2019) Global supply chain hotspots of a wind energy company. Journal of Cleaner Production 210 (2019) 1042e1050. https://doi.org/10.1016/j.jclepro.2018.10.216
- WRI & WBCSD *Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, 2011
- CDP *Technical Annex IV:Scope 3 Overview and Modelling, CDP Full GHG Emission Dataset 2016*
- Hertwich, E.; Wood, R. The growing importance of scope 3 greenhouse gas emissions from industry. *Environ. Res. Lett* 2018, 13 (10), 104013