Allocation of emissions and of emission reduction

Main Supervisor: **Karl W. Steininger** [**showcase 1**]
Research field "Climate and environmental economics: Economic analysis of climate change impacts and mitigation policies"
Research question 1 | Cluster 1
Links to showcases Meyer 1, contributes to the normative show cases in cluster 1 (Schulev-Steindl, Bednar-Friedl), and collaborates in cluster 3, in particular to analyse the transformation of the electricity system (Posch 2), and of mitigation policy (Schulev-Steind 2).

Background: GHG emissions can be allocated according to different principles (extraction-, income-, production- or consumption-based) to the various agents and respective countries along (international) production chains (Steininger et al., 2016). While accounts of recent (i.e. most often back to 1990) emissions have become well available for countries across the globe when following the last two principles, their robustness, especially when including historic emissions, can be uncertain, and allocation following other principles is scarce.

Goal: This project first investigates the robustness of (historic) emission accounts across the four allocation principles, as one core parameter for compensation claims for climate change losses and damages. For industrial countries consumption-based accounts tend to show highest emission levels, with electricity usually being the single quantitatively most important source sector of emissions embodied in imports from production chains across the globe. With the decarbonisation potential being particularly high for electricity production (e.g., Rogelji et al., 2015; Steininger et al., 2017a), the second goal is to analyse mitigation efforts by the expansion of photovoltaics (PV) at home and abroad, and identify efficient global GHG reductions by nationally determined contributions (including FDI in clean electricity) and their relation to alternative mitigation target bases (including consumption based emissions).

Methods and disciplinary background: This project applies multiregional input-output (MRIO) modelling for GHG emission allocation, drawing from emission data bases according to a hierarchy structure (Steininger et al., 2017b), expanding to historic as well as income-based emissions. Improved market organization can enhance efficient expansion of (variable) renewable electricity (MIT, 2016). Presupposing such development in industrial and selected southern countries multisector, multiregional CGE analysis (building on electricity generation disaggregated by technology) is employed to quantify economic and environmental consequences of funding PV system investment (home/abroad).

References:

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