

Macro-economic impacts of Renewable Energy Transition in India: An Input-Output LCA approach

Topic: Energy Input-Output Modeling II (Chair: Lorenzo Rinaldi, Politecnico di Milano)

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India's higher emphasis on adoption of Green Energy for power generation in recent years is aligned with the twin Sustainable Development Goals (SDG) 2030 of tackling climate change (SDG 13) and ensuring sustainable, affordable, reliable, and modern energy to all (Goal 7). This study intends to evaluate the economy wide impact of India's ambitious 280 GW solar and 140 GW wind capacity expansion programme by 2030 using a hybrid Input Output model. It is used to estimate the consequential LCA impact for solar and wind energy across the economy. The environmental dimension "air, water and solid waste treatment is endogenized in the hybrid Input-Output model such that the pollution abatement cost is fed back into the economy. Preliminary findings provide interesting results. The impact total output on wind industry (0.84%) is higher than the solar PV industry (0.04%) and capital-intensive sectors such as iron and steel, chemicals and petroleum products benefit the most. However, the economic impact in terms of GDP and employment is minimal since the RE industry is at a very nascent stage in its development. Furthermore, environmental burden of solar PV and wind turbine waste of approximately 2.9 million tonnes (MT) and 18.5 MT, respectively are primarily from heavy metals such as zinc, chromium, iron and lead which will create huge abatement cost and simultaneously provide an opportunity to engage the circular economy potential at end-of-life phase. Proceeding with the RES capacity expansion, without accounting for the impending waste accumulation will make India drift further away from its clean energy targets. The substantial savings in emissions and material resources from transition towards RE sources and circular economy approach can serve as a catalyst in helping India achieve its decarbonization targets under the COP26 accord and SDGs simultaneously.