

A Hybrid Energy Input-Output Table for India: Computing Sectoral Energy Needs and GHG Emissions

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

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In this paper, India's 131-sector Input-Output Table 2015-16 is used to compute the direct and indirect energy consumed and emissions produced by the intermediate production and final-use sectors of the economy through the construction of a 34-sector hybrid Energy Input-Output Table (EIOT). The EIOT contains ten energy sectors: coal and lignite, biomass, crude petroleum, natural gas, combustible petroleum products, non-combustible petroleum products, coal electricity, other thermal (natural gas and petroleum products) electricity, large-scale hydro-electricity, and renewable energy sources & nuclear electricity. Of these ten sectors, three produce emissions when burnt: coal and lignite, biomass, and combustible petroleum products. While the input-output transaction flows are expressed in monetary terms, the flows of energy have been expressed in kilotonnes of oil equivalent (ktoe), and the flows of emissions have been expressed in tonnes of carbon dioxide equivalent (tCO₂e). A hybrid unit approach is used by taking the constructed 34-sector EIOT to compute the Leontief inverse matrix in ktoe and tCO₂e terms, which provides the coefficients indicating each sector's direct and indirect energy requirements and emissions per rupee of final demand. The data for this research has been sourced from India's Supply and Use Tables, Energy Statistics, Coal Directory, Petroleum & Natural Gas Statistics, Electricity Statistics, Biennial Update Report and IPCC Guidelines for National Greenhouse Gas Inventories. The results of the emissions analysis show that sectors have embedded emissions from their consumption from upstream industries. When making projections for the future growth of these sectors, these should also be considered. Low-emission technologies in the upstream sectors will reduce indirect emissions from downstream sectors – for example, increasing the share of renewable electricity generation will reduce indirect emissions from electricity-intensive sectors. Policies are needed to reduce emissions by adopting more-efficient production technologies and conserving the use of coal and petroleum products.