

Mapping regional dichotomy of Green Growth: 175 GW renewable capacity & Indian States

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The paper evaluates the dynamics of change across regional boundaries as India adds 175 GW of grid-connected renewables by 2022. The decision to transform the energy mix also brings with it concerns about distributional impacts across Indian states given the geographic availability of conventional resources (i.e., coal is available mostly in five eastern states, while renewables are more prevalent in the western and southern states).

The analysis compares and contrasts the sustainability impacts of meeting designated state-level targets for renewable capacity additions in three (Gujarat, Madhya Pradesh, and Jharkhand) distinctly positioned states: i) high renewable energy generation (RET) capacity state; ii) coal-bearing state with high RE capacities; and iii) coal-bearing state with low RE capacities using E3-India model.

The model provides a dynamic and integrated evaluation of the economic, energy, and environmental linkages using a macro-econometric framework at the state-level for India. This not only allows the estimation of crucial energy and environmental indicators, but also brings in state-specific economic structures within the assessment framework.

The assessment mapped economic and social indicators like GDP, investments, employment, and real personal income, along with the environmental benefits of renewable capacity addition in terms of a reduction in emissions (CO_x, NO_x, SO_x) at the state level. Preliminary results reveal that under the business-as-usual scenario, the existing RET targets will have strikingly different manifestations for the three different categories of states. Fulfilling the existing renewable energy technology (RET) deployment targets can induce GDP growth of over 6.01 percent in coal-bearing high-RET capacity states like Madhya Pradesh, may lead to a decrease in GDP for a coal-bearing state like Jharkhand due to the reduction in coal use, and may result in a moderate GDP increase in a high-RET state like Gujarat. Similarly, investments, employment generation, and personal incomes due to an RE capacity addition are higher in Madhya Pradesh and Gujarat as compared to Jharkhand, where RET capacity installation is low and backlash of idled capacities is significant due to an overall reduction in coal consumption nationally (30 percent) with the addition of 175 GW of new renewable capacity.

The results of the study highlight the existing dichotomy in the Indian green growth agenda from a spatial and sustainability perspective. The work also demonstrates the relevance of an integrated quantitative assessment framework like E3-India to analyse the distributional impacts of an existing policy target at a regional level, thereby enabling and informing various stakeholders about suitable policy interventions.