Introduction to the E3-India model

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E3-India is a new state-level model for India, developed from the global E3ME macro-econometric model, linking the economy, energy, and emissions systems. The model is designed to assess policy through a highly empirical structure, whereby historical data is fed into econometric estimations of model interactions, forming a consistent modelling framework. As a general model of the economy, E3-India can be used to assess a wide range of fiscal and general macroeconomic policies. However, it has been designed with a particular focus on the energy sector. Policies can be introduced into this framework at a state level, allowing energy system and socio-economic impacts to be assessed both within that state and through trade spillovers into other states.

The model is macro-econometric in nature, based on a post-Keynesian framework within which optimisation is not assumed (i.e., it is not a general equilibrium model). Through accounting identities, demand must equal supply, but demand can be less than or equal to total potential supply; the implication of this framework is that, under the right conditions, it is possible for regulation to increase output and employment. E3-India combines the features of an annual short- and medium-term sectoral model estimated by formal econometric methods with the detail and some of the methods of CGE models, providing analysis of the movement of the long-term outcomes for key E3 indicators in response to policy changes. It is essentially a dynamic simulation model that is estimated by econometric methods.

A key advantage of the E3-India model is its structure. The model disaggregates the economy by sector, which allows the representation of fairly complex scenarios at state-level, especially those that are differentiated by sector. Similarly, the impact of any policy measure can be represented in a detailed way, for example, showing the winners and losers from a particular policy. The full integration of separate energy, environment, and economy modules is undoubtedly an advantage over models that may either ignore these interactions completely or only assume a one-way causation.

E3-India also includes explicit treatment of technology, using the Future Technology Transitions (FTT) modelling framework for the power sector. This approach is qualitatively different from the optimisation tools that are used in other analyses and draws on theories from post-Keynesian and evolutionary economics. Instead of trying to find least-cost pathways, the model simulates the responses to policy inputs (including both regulation and market-based instruments) and is parameterized on real-world time series data.