

# An Analysis of Relevant Issues in Energy Consumption in India: A Mathematical Modeling Framework and Applications

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*The paper uses an input-output framework to calculate energy intensities for different sectors in Indian economy. The overall energy intensity has declined during 1983-1990. A decomposition model analyses the causes for this change. The energy demands have been projected for year 2002. In this paper impacts of output changes and energy price changes have also been analyzed.*

## 1. Introduction

The energy requirement of an economy is sensitive to the rate of economic growth and energy intensity of producing sectors. The energy intensity of producing sectors is a function of technological progress and varies from sector to sector. Indian energy resources are highly utilized and the economy is dependent on imports particularly of petroleum products. In this context it becomes important to analyze sectoral energy intensity in Indian economy.

The supply side of energy i.e., its production and distribution aspects are well researched. The conclusion derived from most of the supply side studies indicates that it is not possible to increase the supply because every additional unit of energy production is costly (Planning Commission, 1997). In this context, it is important to analyze sectoral energy intensity in Indian economy. A study of energy intensity is important from sectoral policy point of view for India. This paper analyzes following questions in the context of Indian energy sector. (i) How have different sectors of economy performed with respect to energy efficiency over time? (ii) What will be the energy requirement if these stipulated goals of economic development have to be achieved? (iii) What are the causes for changes in energy consumption by different sectors?

This paper uses a static Input-Output (I-O) framework to analyze energy issues in the short run. We use I-O tables for the years 1983-84 and 1989-90 to (a) calculate direct and direct + indirect (referred as total energy in this paper) energy intensities (b) quantify the causes of changes in energy changes over the period 1983-1990 (c) project the energy demand for the year 2002 (d) analyze impact on energy requirements by a given change in final demand (e) estimate overall effect of energy price change (f) quantify the shares of consumption, investment and net exports in total energy and to (g) formulate policy strategies. We try to analyze causes for changes in energy consumption of different sectors as well. Rest of the paper is organized as follows. Section 2 discusses the energy-economy linkage. In section 3, we discuss the models used. The data and the methodology to transform the data are discussed in section 4. Results are presented in section 5. Section 6 concludes the discussion.

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