

# Abstract

Given the fact that all the risk covering mechanisms such as central government counter-guarantees, escrow accounts and non-fund based assurance by the Financial Institutions have failed to induce lenders to invest in the Indian Power Sector. It has been realized that investment conditions may not improve unless secure markets are created for independent power producers. The fundamental obstacle to private power investment in the power sector is the weak financial position of the State Electricity Boards (SEBs), which operate virtually the entire country's distribution network. Potential IPPs will depend on these SEBs to sell the power they generate. The need for designing a productivity management and a tariff rationalization mechanism, hence, becomes clear. This thesis attempts to do this by benchmarking physical operations and tariffs against the best practice prevalent in the industry and draws unit specific and sector specific inferences using mathematical programming (Data Envelopment Analysis (DEA)) and econometric (Stochastic Production Frontier) techniques as tools for benchmarking. The thesis has three major chapters on generation, transmission and distribution and determination of "optimal" revenue and tariff's. The chapter on generation uses DEA on all coal-based plants of National Thermal Power Corporation for the period 1991-95 to evaluate the operational inefficiencies of generating units. The DEA approach provides us with a best practice frontier, which can then serve as a benchmark for major parameters like generation per unit of coal consumed, generation per unit of oil consumed and generation per unit of auxiliary power consumption. Slack analysis indicates the causes of inefficiency. It is possible to identify those generating units that need renovation and repowering and those where the performance could be improved by training of operating personnel. I then use DEA to evaluate inefficiencies in the transmission and distribution (T and D) system of various Indian SEBs. The DEA approach provides with a best practice frontier, which can then serve as a benchmark for efficiency. Dual variables indicate the causes of inefficiency. It is also discovered that there is little convergence in ranks of SEBs over the period 1977-93. The chapter on tariff rationalization uses DEA (with the data of 15 SEBs from 1977 to 1993) to determine output price (tariff) efficiency for the SEBs. The model is also used to determine tariff distortions and undeflated shadow tariffs. The results indicate considerable and increasing cross subsidization of agriculture and domestic consumers by other consumer categories. Recommendations in four broad areas are drawn from the thesis (i) Improvement in existing capacity and resource utilization. (ii) Price Reforms (iii) Sector Reforms and (iv) Promotion of Independent Power Producers.