



ROLE OF ELECTRICITY SECTOR AND INDUSTRIAL DEVELOPMENT IN TAMIL NADU

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Abstract

Energy is a universal measure of all forms of work and its consumption is increasing worldwide. Combustion of fossil fuels such as coal, petroleum oils and natural gas produces energy, which is mainly used to improve the quality of life. As these conventional fuels are rapidly depleting, it is necessary to study the existing energy users, consumption patterns and demand, especially in urban areas for efficient use of energy. In this regard, the present investigation is being conducted in Tamil Nadu, the second and fifth largest and most populous city in the state of Tamil Nadu, India. Energy consumers are identified in these cities and they are classified into industrial segments. The energy requirement of these sectors is measured and the energy consumption for these sectors is analyzed. With increasing energy demand and environmental degradation, it has been concluded that the implementation of energy conservation measures and the implementation of energy consumption including the use of renewable energy sources is necessary not only to match energy demand and supply of energy but also to safe guard the health and wealth of the inhabitants in Tamilnadu.

Keywords: Renewable energy, Energy Consumption Market reform, Market Transition, Integration, Solar, Wind, Thermal, Flexibility from demand, Energy storage.

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Introduction

The power sector in India is currently undergoing a major transformation. The rapid pace of capacity addition over the past few years has led to a situation where power supply capacity exceeds economic demand, a scenario unprecedented in the history of the Indian power sector. Climate change, energy security concerns, etc. are witnessing changes in the energy mix due to improved policy, due to which the penetration of renewable electricity, especially from wind and solar energy, is increasing steadily and is expected to grow a lot. Fast forward to the coming years. Demand patterns are also undergoing changes due to intermittent urbanization, increased space renovation burdens and the adoption of energy efficiency initiatives. This study aims to examine the impact of socio-economic characteristics on household electricity use patterns and choice and demand for electricity sources at the household level in Tamil Nadu. With the help of income, expenditure, price and household survey data, several steps were used to estimate the profit function and the quantity of choice and demand. The study reveals that electricity sources of rural and urban households are used for different purposes. The main determinants of electricity availability are the price of electricity, income, education and regular wage earning capacity of households.

Objectives

- To Identification of renewable resources that Tamil Nadu can develop.
- To quantification of overall energy usage in the industry sector.
- To Analyzing energy consumption and its costs in the industrial sector.

Commercial Energy Consumption Pattern

Commercial energy consumption accounts for 74 percent of India's total energy consumption. Coal and lignite account for 74% of total energy, 10% natural gas, nine percent and seven percent hydro and other new and renewable energy. More than 26 percent of total energy consumption is accounted for by commercial conventional energy sources such as firewood, cow dung and agricultural waste. Import dependence on mine and petroleum products is expected to heighten soon this is an important feature of India's energy sector and its linkages with the economy.

In 1953-54 the transport industry was the main consumer of commercial energy. However, the share of the transport sector is gradually decreasing while the proportion of households in agriculture and others is increasing. Oil and gas account for the majority of commercial energy usage. A high rate of economic expansion has led to such an increase in energy consumption.

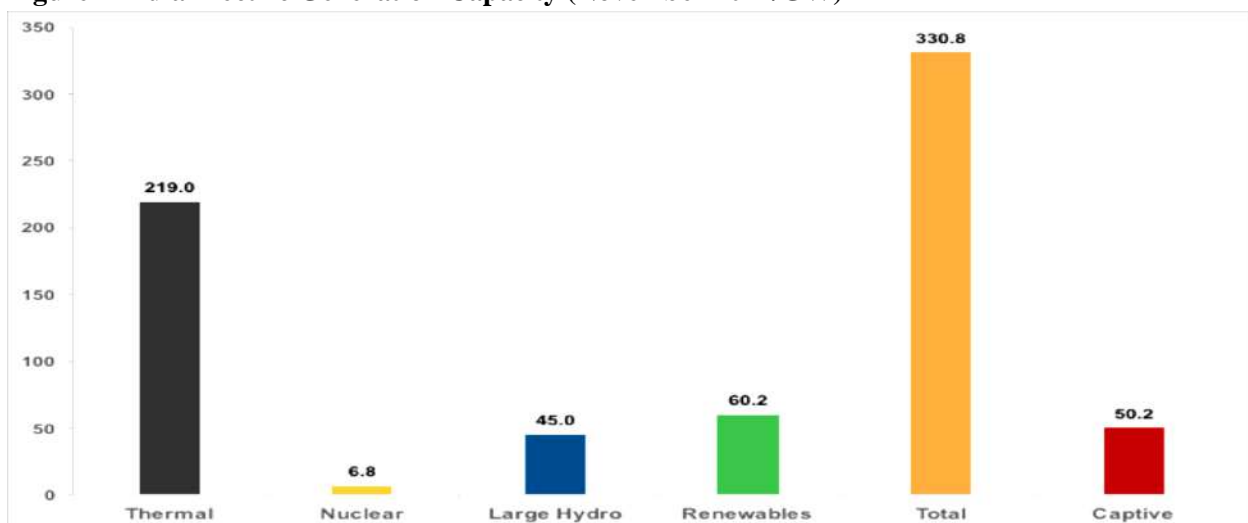
The patterns of energy consumption in any economy is essential to understanding how the final demand drives energy use or consumption. SEEA-Energy states that “environmental pressures at the level of resource use and production, may actually be defined by the end use that initiates the production chain”. In addition, to fully understand the climate change process, data on many consumption activities, such as heating homes and buildings, electricity consumption, various industrial processes and transport that leads to combustion processes required.

Energy-related air emissions are measured and monitored by the global economy, as most economic activity is related to the combustion/consumption required to produce energy. With the increasing focus on sustainable consumption and production patterns worldwide, resource use and environmental pressures are seen as determinants or drivers of the end use and consumption of products. According to the International Energy Agency, since March 2017, India has been an Associate Country with a total energy consumption (TEC) in the economy of a is a good indicator of efficient or inefficient use in economic activity and can suggest course-corrective measures for sustainability. This sum of consumption is assigned to the final consumption sector and non-energy consumption. Used for energy for use in transformation processes and energy-producing industries. Thus, final consumption largely reflects deliveries to consumers and represents the total amount of energy needed to satisfy domestic consumption. This chapter presents the overall utilization of energy resources in India along with the wise use of various energy resources and products.

Power Sector of India

The Indian electricity market is undergoing a major transformation: while capacity is expanding to meet expectations. As demand grows over the coming decade, the Indian government is leading a major effort to diversify supply. In 2016 - 17, 76% of total generation was powered by coal; IEEFA predicts that the market is on track to reduce this overdependence on coal to just 57% by 2026 - 27. This unprecedented loss of market share for coal reflects new economic realities created by technological and financial disruption. Beyond the obvious merits of systematic real price deflation, India is developing a less polluting, more sustainable energy system better suited to meet its economy requirements. Additional energy security benefits reduce inflationary fossil fuel imports and job creation opportunities from a US\$500 billion investment across India's electricity system over the coming decade. Thermal power (coal, diesel and gas) currently accounts for 219 GW or 66% of India's total installed on-grid capacity of 331 GW. Average utilization rate at 57% 016/17, thermal power provided 80% of the total power generation in 2016/17 (Figure 1).

Figure 1 India Electric Generation Capacity (November 2017/GW)



Source: Central Electricity Authority (CEA)

Structure of Tamilnadu Electricity Board

In 2010 Tamil Nadu Electricity Board Limited was restructured as the TNEB Ltd as a holding company, plus two wholly-owned subsidiaries; Tamil Nadu Generation and Distribution Corp. and the Tamil Nadu Transmission Corporation along with the Electricity Act 2003 which required state electricity boards to divest fired power and 0.5GW gas power. It also had contracts for 0.6 GW central government-owned thermal power generation and five to six privately owned thermal power plants. Supply as of March 2017 10 point 6 GW of non-renewable energy capacity conforming to contracts (7.9 GW wind, 1.7 GW solar, 0.2 GW of biomass and 0.7 GW from biomass co-generation plants).

Tamil Nadu Electricity Market

The total on-grid installed capacity in Tamil Nadu as of March 2017 was 30.1 50 percent installed in India. Like other parts of India, the state is heavily dependent on coal firing. Generation capacity for its power needs (45% of capacity, 69% of generation in 2016/17 – Table 1). Installed thermal capacity in Tamil Nadu has grown at an average of 10 percent per annum since 2011. At the same time, the new main reason for this report is Tamil Nadu's lead in India overall. Installed non-renewable energy capacity and generation especially wind waves Tamil Nadu's peak power resource deficit has continued to decline and has reported zero peak power supply deficit since 2016-17.

Table 1 - Composition of Tamilnadu Electricity Sector (2016/17)

Source	Electricity market Composition 2016/17					
	Capacity		Generation		Capacity	YoY change
Coal	13.4	45%	66.6	69%	62%	2.1
Gas	1.0	3	2.2	2%	25%	0.0
Diesel	0.4	1%	0.9	0.9 1%	25%	0.0
Hydro	2.2	7%	2.4	2%	12%	0.0
Nuclear	2.4	8%	9.7	10%	57%	1.0
Renewable	10.6	35%	15.2	16%	18%	1.8
Total	30.1	100%	97.0	100%		4.9

Source: Central Electricity Authority of India, IEEFA estimates & calculations

Industries

It consumes more distributed energy than industrial and end-use industries. 54 percent of the total supply capacity. There are three types of industrial production.

- ◆ Energy-intensive production.
- ◆ Non-merging intensive production and.
- ◆ Nonmanufacturing.

The composition and intensity of fuel consumed in the industry vary between regions and states,

depending on research and technological progress in economic activity. Process and steam and synthesis Process heating and cooling and lighting Heating and air conditioning for buildings Examples of how energy is used in industry Industrial basic chemical raw materials are also used.

Coal Power Plants: TANGEDCO

TANGEDCO, Tamilnadu vertically integrated state distribution company owns 4.32 GW of coal-fired power generation capacity of these 1.89 GW will exceed 35 years of age by 2027. The company's main TN coal plants include:

- The 1.05 GW Tuticorin Thermal Power Station, a subcritical coastal plant using seaborne coal import through the port of Thoothukudi (commissioned 1979-1991).
- The 1.44 GW Mettur Thermal Power Station (commissioned 1987-2013), an inland location requiring coal to move by rail to ports in India's Northeast for coastal shipping to Ennore Port in TN before being reloaded on rail wagons to get to Mettur (600 MW is supercritical, the 840 MW is outdated subcritical technology).
- The 1.83 GW North Chennai Thermal Power Station is located at the Ennore Port and was commissioned in 1994-2014 (all outdated subcritical technology),

The 450 MW Ennore Thermal Power Station located at the Ennore Port was commissioned in 1970-1975 and after more than 40 years of operation was decommissioned in March 2017. The site is being used for a replacement supercritical thermal power plant of 660 MW that is currently under construction and due for commissioning in 2018/19.

Renewable Energy Sources

2018 report listed Tamil Nadu as one of the top 9 renewable energy markets in the world. Today 14.3% of all energy service in the state is met by renewable energy for the first time through solar and wind. The demand for energy is always increasing despite the low prices of mine and other fossil fuels. Energy demand, especially in electricity generation, results in fossil fuel-based power generation that is substantial. Energy demand, in particular, electricity production has resulted in the creation of fossil fuel based power plants that let out substantial greenhouse gas/carbon emission into the atmosphere causing climate change and global warning.

The Government of Tamil Nadu is committed to mitigating the effects of climate change by bringing in policies to promote renewable energy generation in Tamil Nadu. The government wants to adopt renewable energy like rainwater harvesting as a people movement. States are developing with different types of renewable energy sources. Environmentally friendly renewable energy sources are inexhaustible in nature and are best suited for locally available and decentralized applications. The important renewable energy sources are as follows:

- Wind Energy (including offshore wind)
- Solar Energy

- Biomass and other forms of bio energy
- Small Hydro
- Tidal Energy
- Ocean thermal Energy

Among the above-mentioned sources the first three non-renewable energy sources i.e. wind and bio energy are used in large scale in India and Tamil Nadu. The Tamil Nadu Energy Development Agency has been created to develop and propagate non-conventional energy sources. The Tamil Nadu Energy Development Agency (TEDA) was formed.

Conclusion

Examining trends in energy use in India can characterize trends in industrial growth and change in developing countries. India differs markedly from countries like Australia, Belgium, Denmark, France, Germany, England, Norway, United Kingdom and Japan when looking at industrial structural change. Economic growth in these countries since 1970 has been gradually decoupled from the use of natural resources in absolute or relative terms. Depletion of resources and reduction of environmental pollution Application of earlier environmental protection measures and adoption of less polluting technologies in industry.

Energy is a universal measure of all forms of work and its consumption is increasing worldwide. Combustion of fossil fuels such as coal, petroleum oils and natural gas produces energy. It is mainly used to improve the quality of life. In Tamil Nadu, the second and fifth largest and most populous city in India, consumers are identified and classified into industrial segments according to the current situation. Which sectors require energy is measured and the energy consumption for those sectors is analyzed. It has been concluded that due to increasing energy demand and environmental degradation, it is necessary to implement energy conservation measures and energy consumption including use of renewable energy sources to protect health depending on energy demand and energy resources but also to safeguard the health and wealth of the inhabitants in Tamilnadu.

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