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# Foreign Direct Investment, Demand and Economic Growth in the Power and Energy Sectors

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***Abstract---*** *India makes a major contribution to the overall economy of South Asia, but is faced with a major energy crisis for many years. In the earlier scenario, it has been seen that the economic growth was strong and energy demand was rapidly rising, there were no concerted attempts to meet the country's energy demand. Like other developing countries, Foreign Direct Investment (FDI) plays a key role in this country's economic growth. In various sectors of the economy, India has been received FDI from many countries. This paper highlights the current status of the power and electricity industry in India (PESI), and presents an empirical study on FDI causation in the electricity and energy sector, energy consumption and Indian economic growth between 1990 and 2019. In the last few years the FDI market has drawn a relatively higher rate of FDIs over India than the other economic sectors, as shown by the FDI channel. In contrast, energy production levels and the use of resources in previous years show a significant difference. The result showed that economic growth and energy consumption have a strong, two-way, short-term causal relationship. The results also demonstrate the long-term causality in the energy consumption equation. Taking into account the current PESP situation, policymakers ought to draw up strategies to reach the minimum level of debt and to discourage investment dependent on the loans. Such policies would help to control and increase the economic growth of the severe energy crisis. This paper attempts to establish the possible causalities and comparative connections between electricity consumption, foreign direct investment and Indian economic growth.*

***Index Terms---*** *Demand, Economic Growth, Energy Consumption, FDI, Market Size, Power and Energy Sector*.

## I. INTRODUCTION

Investment actually seems to be a major factor in any country's economic growth. Specifically, the main source of economic growth in developing countries is foreign direct investment (FDI).[1] Globalization has helped foster strong economic integration between countries over the past few decades. Determining barriers to international trade and investment have altered their economic policies. As a result, there is intense competition for the attractiveness of FDI among developing countries. For developing countries, like India, FDI is in many respects helpful. First, it creates resources for the growth of positive externalities in the region, such as work production, technology transfer, management skills, productivity gains, research and development and new production methods. Second, domestic investors are encouraged to invest in the country. Today, despite various political and economic problems, India is on the worldwide



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map for foreign investors. Indeed, India has adopted investment-oriented policies to provide foreign investors with opportunities. The FDIs are provided from China, the US, Japan, Norway, Britain, Hong Kong, and Saudi Arabia, all of which are from different parts of the world in India. FDI's focus industries include energy and power, banking, manufacturing, infrastructure, transport, textiles and export. India's power and energy market is one of the main industries attracting a higher level of FDI[2][3]. A new power plan has recently been unveiled by the Government of India (GOI) and offers various incentives to encourage domestic and foreign investment in energy and power sectors. Economic productivity is a critical source of resources. In addition, the growth in production helps increase demand for energy by increasing consumption of energy. The energy consumption level is directly related to a country's overall progress. The per capita use of resources is therefore used as a metric for calculating a country's socio-economic development. As in other developing countries, India's energy demand and usage have steadily increased as its population is increasing. Several countries of Southern Asia are faced with a serious energy crisis because of their high oil and gas dependence, diminishing capacity, circular debt, protection and pressures on power and weak governance. Policies to achieve minimum debt levels and deter loan-based transactions should be designed in order to control the energy crisis. It is important to evaluate government policies in order to take an impartial view of the FDI on electricity and energy issues so as to incorporate adequate FDI in the industry and its contribution to the country's overall economy. No longitudinal research in Pakistan was undertaken to investigate the unique flow of FDI in power and energy sectors and the effects of this in terms of economic growth, to the best of our knowledge. The aim of this paper is to examine the factors in the energy and energy sectors of the FDI, the energy consumption, and Indian economic growth. This paper also highlights the overall structure and major constraint of the power and energy sector of India (PESI). Based on BP Energy Outlook, India's energy consumption will grow more rapidly than all major economies worldwide. Nonetheless, Asia's second-largest energy user since 2008, Japan overtook the United States and China in 2015, becoming the world's third largest oil consumption region. It has been expected that by 2035 India's energy use is increasing most rapidly among all major economies. India's consumption growth in fossil fuels will be the largest by 2035 and by 2030 it will overtake China as the largest energy growth market in terms of volumes. Globally, energy demand will rise by approximately 30 percent by 2035. Natural gas consumption will increase faster than either oil or coal. The country will continue to be dependent in terms of imports despite increased production. The energy sector in India is one of the world's most complex. Solutions vary from conventional sources such as coal, lignite, natural gas, and oil and hydropower production to feasible and non-conventional options such as wind, solar and farm and household waste. The demand for electricity in the country has risen rapidly and is expected to continue to rise in the coming years. A massive addition to the installed power generation is needed in order to satisfy the increasing demand for electricity in the country. In May 2018, India ranked 4th in the Asia Pacific region out of 25 nations on an index that measures their overall power.[4][5]

## II. OVERVIEW OF INDIA'S POWER AND ENERGY SECTOR

India is the third largest power manufacturer in the world and the third largest energy user. As of 30 November 2019, the Indian national electricity grid has an installed capacity of 364.96 GW. 34.86 percent of the total installed capacity



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of India comprises renewable power plants[6], also including major hydropower stations. In the fiscal year 2018-19, Indian gross power generation amounted to 1.372 TWh and the total electricity production (user and non-user capacity) was 1.547 TWh. In 2018-19, the average energy consumption per capita was 1.181 kWh. In 2015-16, the world's highest (17.89%) energy consumption was recorded in agriculture. Notwithstanding India's low energy tariff, per capita electricity consumption is low compared to most other countries. India has excess capacity for power generation, but it lacks sufficient infrastructure for transmission. The Government of India initiated an "Energy for All" initiative in 2016 to address this issue. The system concluded by December 2018 to provide all homes, businesses and commercial institutions with the necessary infrastructure to ensure continued supply of power[7]. Funds was supported by the government of India and its constituent States in partnership. Fossil fuels, mainly coal, dominate the electricity sector of India, which generated approximately three-quarter of the country's electricity during the fiscal year 2018-19. The government aims to boost renewable energy investments. The 2018 National Electricity Plan states that the country needs no more power stations in the electricity market until 2027; 50 025 MW of coal-fired power stations under construction are under construction and an extension, following elimination of approximately 48 000 MW of coal-fired power stations, of 275,000 MW of maximum renewable power.

## III. POWER SECTOR & MARKET SIZE IN INDIA

The Indian electricity sector is undergoing a major change that has redefined the business outlook. In India, sustainable economic development is still increasing demand for electricity. The Government of India has increased the capacity increase in the country in terms of its emphasis on "energy for everyone." At the same time, the market and supply sides of industry (fuel, logistics, finance and manpower) increase the competitive intensity. As of May 2019, gross planned power plant capacities are 356.82 gigawatts (GW).

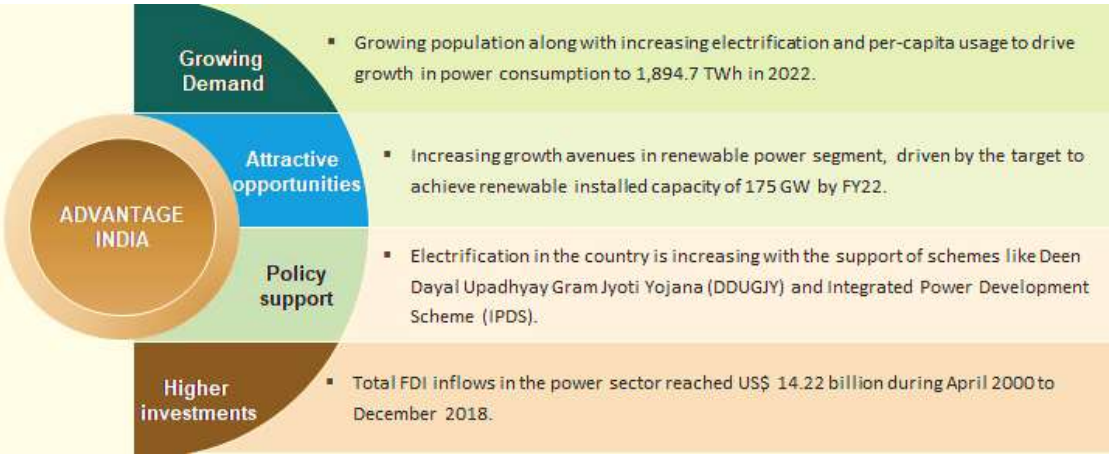


**Figure 1:** Power sector in India October 2019



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## IV. POWER GENERATORS AND POWER DISTRIBUTORS

Electricity is a lifeline without which people cannot afford to survive in the 21st century. Electricity is necessary for most operations, whether commercial, industrial or domestic. Electricity boards usually provide electricity to manufacturing, commercial and domestic applications (called grid) with the intention of providing round the clock continuous power. This method of supply assists fixed entities like a warehouse, a store or a house to carry out daily activities without any disruption. Other activities include drilling a bore well in a remote area, filming outdoors or building a building site that also requires electricity to function but no electricity supply. In fact, everyday activities of many dependents cease when the grid power supply is disrupted due to a power break. In such instances, generators and natural energy supplies are saved and turned into a life-line to avoid the required operations needing electrical power. Three main investors, distributors / suppliers and retailers are active in the generator industry. They each have a specific role to play in the industry's development. Most big manufacturers and a growing number of smaller manufacturers run the generator industry in India. They produce quality generators of different sizes according to Indian and international standards. These included ISO 8528 for fixed generation, ISO 10000 (natural vacuum cleaners), BS 5514 for interconnection of internal combustion engines, IS, IP, and IEC alternation specifications, IS and ISO acoustical enclosure standards and USB, ISO and ISO requirements. It must comply with the notifications and guidelines of the Central Pollution Control Board (CPCB), in view of various parameters, including noise and emissions. Such companies invest heavily in the development of state-of - the-art production facilities for high-grade generators. The two major generator forms made are diesel generators and gas generators. Off-late, the producers have shown an interest in developing solar and fuel-dependent hybrid generators[8]. Generator production is usually classified in accordance with the following KVA ratings:

- 5 KVA - 75 KVA
- 75.1 KVA - 375 KVA
- 375.1 KVA - 750 KVA
- 750.1 KVA - 1,000 KVA
- 1,000.1 KVA - 2,000 KVA
- Above 2,000 KVA

Of these classes, 5 KVA generators, with a range of applications between 5 and 75 KVA, are the most market share due to their efficiency. In fact, these generators can easily be found at an affordable price. For high-end applications such as fracking well excavation, concrete mixing and other construction and mining operations, higher rating generators are used. Generator manufacturers also make portable generators which are used as a standby power source in times of power cuts from the grid supply by millions of institutions across the world. Fuel efficiency and low costs of production also are the priority of generator manufacturers.

A two-stage distribution system including manufacturers and retailers takes place on the generator market. A licensed manufacturer or generator provider of a state generator usually serves a company in a particular state in which distributors from different districts work in the region. Dealers are responsible for developing the demand in their jurisdictions, by naming dealers to represent all customer segments. Each dealer would appoint as many dealers as required in consultation with the manufacturer. The dealer also teaches the operation of generators by distributors. The supplier stocks the



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necessary generators on the market and provides loans to the dealer. The generator industry has several main divisions dependent on KVA and the end user parameters. The end user section contains, for example:

- Commercial – retail, offices, shops, hospitals, and hotels
- Industrial – manufacturing, energy generation, drilling, mining and transportation
- Residential – homes and small offices

Often, a generator manufacturer supplements the distributor's effort with support from a company representative dedicated to facilitating the end user. The company is pursuing a separate service model from the distribution process. A service broker is designated by each generator maker to fulfil all service's needs. Through setting up call centres to ensure timely resolution of any service problems, the business feature keeps pace with the requirements of the industry for a client or end user, a generator manufacturer is the main point of contact. The supplier teaches suppliers, including mobile generator dealers, on all facets of distribution with the help of the generator's marketing team. Through making cold calls and assisting with the marketing efforts of the distributor through the advertisement and sales promotion operations, the generator dealer routinely taps out end-users in the region. The generator dealer maintains a warm relationship with the end user and works with any dispute by liaising with the retailer and the supplier. In short, the retailer becomes the object of the success or failure of the business of the generator maker. Typical operations including deployment and regular engine servicing are carried out by a turbine dealer. A generator distributor is also a point man to ensure that services are provided without any hitches to keep the engine running.

## V. KEY DEVELOPMENTS AND THE CURRENT STATE OF THE INDIAN POWER SECTOR

Power is considered a central industry because it promotes growth through diverse sectors, including mining, agriculture, business and railway industries. Although the fifth biggest capacity in the world at 1.92.792 MW3 currently exists in India, the growth in the economy is projected to boost demand for electricity in the coming years.



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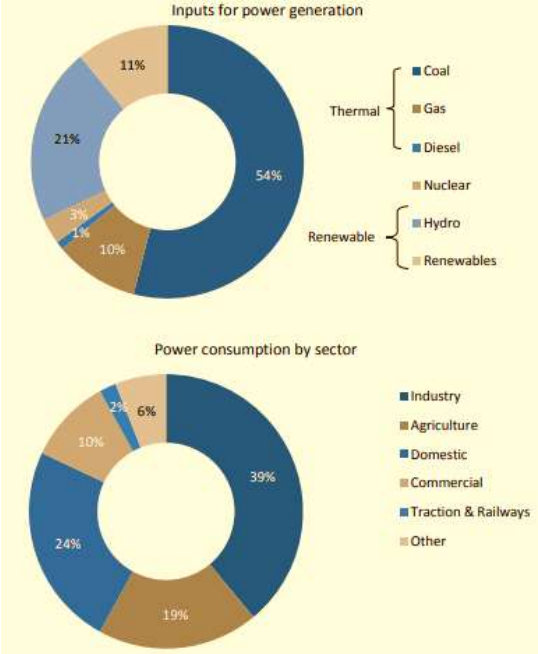


**Figure 2:** Inputs for Power Generation and Power Consumption by Sector

As shown in Figure 3, India's potential for power generation has increased considerably since 2008, and a significant growth in the future is also expected. In FY 115, India was faced, however, with an energy deficit of about 8.5% and a peak demand deficit of more than 10% due primarily to fuel shortages. The combined technological and trade (AT&C) losses, which amounts to about 30 per cent with a large variation across various utilities can be due to this scarcity. Therefore, proactively growing the sector's generation capacity by tackling core issues such as supply shortage and transmission loss without endangering the ecosystem is necessary for the government to achieve a high growth rate throughout the 12th Five Year Plan.

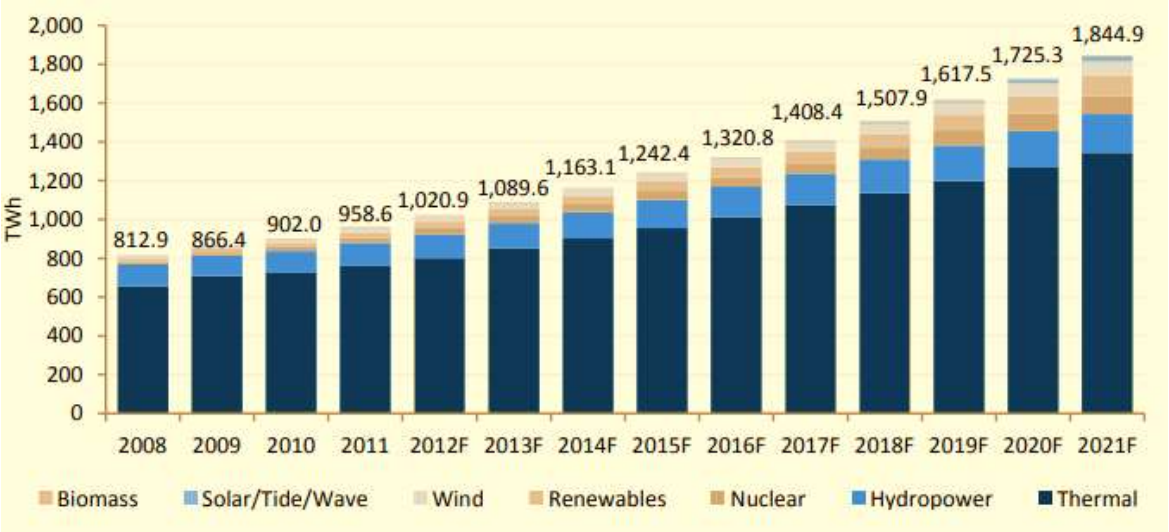


**Figure 3:** India's power generation capacity over 2008–21



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The Indian Government has introduced many step-by-step steps to increase power generation capacity and to boost supply to meet the market deficit. Types cover rural electrification systems and ultra-mega-electric energy initiatives. Foreign direct investment inflows in particular are expected to substantially increase capacity growth. In all sectors of the nuclear power sector the government allowed up to 100 per cent of FDI through the automatic path. As a result, over the past decade the industry has spent over US$ 4.6 billion, of which US$ 1.6 billion is invested exclusively in FY12. Especially the oil and natural gas segment was the result of government New Exploration Licensing Policy (NELP) with total investments from international companies (US$ 2.7 billion since 2000). The expected additional capacity of 76,000 MW and 93,000 MW in the 12th and 13th Five Year budgets respectively supported this leap in overall investment. In fact, the Department of Power's declaration stated that investments of about $300 trillion are expected to be made in the electricity sector because of large-scale development projects in the coming years. The performance of the recent Public Sector Business IPOs under the Ministry of Power is an indication of a large number of investment projects by private investors who have high confidence in the sector.[9]

## VI. FDI IN POWER SECTOR: AN INTEGRATIVE APPROACH

An integrative approach was adopted to consider macro-, micro-, and meso-economic factors in order to analyse the FDI and its determinants in the Indian Power Sector[10]. The macro level covers the entire economy, the microeconomic level denotes companies and the meso-level 159 is a link between entities, such as government agencies that give investment policies to businesses. That separates FDI integrative theory from its counterparts is that it positions the macro-or micro-variables and public-private-sector relations greater importance than previous theories in meso-levels. Public policy is developed and implemented in this area. The meso level is therefore critical for successful public policy implementation. It is at meso-level where regular problems are exposed in the execution of FDI policies and systemic rigidities. Structural inflexibility may be articulated as such by acts such as appropriate training and compensation of public servants, in phenomena such as bribery and red tape. The meso stage, given its significance, has not earned the recognition that it deserves, as scholars have not always been conscious of the daily challenges[11] facing developing countries in carrying out economic and development reforms. Politicians often have hesitation in talking about local sensitivities at the same time. Unfortunately, the discrepancies between the written and operating laws, and the book law and the law interpreted by regulators in foreign investors are broad. Evidence shows that, when they started engaging with state institutions, a lot of potential foreign investors are avoiding the creation of an FDI venture because of the disparities between official and non-governmental business practices[1]. This research was established as a further move to understand EDI in emerging economies, on the basis of the inclusive class, as shown in figure 2.



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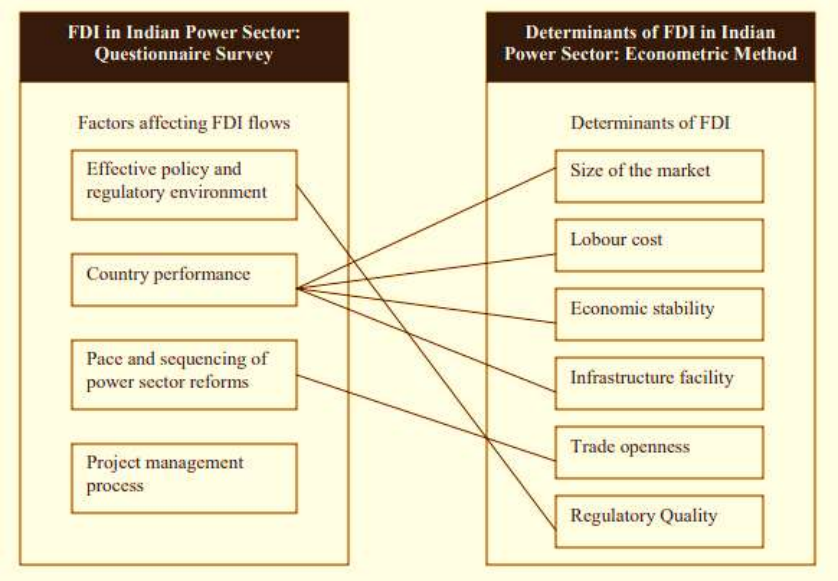


**Figure 4:** Integrative approach for determinants of FDI in Indian Power Sector

This research is interesting in that it demonstrates that there are strong links between project management and flows from the FDI apart from proven influences, namely the active regulatory and political climate, country quality and power reform speed and order. Power plants have a long period of construction associated with volume of investment. The long list of clearances necessary to start the venture in itself dissuades foreign investors by a bureaucratic system.

## VII. FOREIGN DIRECT INVESTMENT (FDI) AND ECONOMIC GROWTH

In order to establish a link between FDI and economic growth, economical literature revolves around the two key modernisation and dependence theories theory. According to the theory of modernization, FDI contributes to economic growth, based on capital investment's impact on growth. FDI provides support in the development of the domestic industry and is a major source of technology transfer from developed countries to developing countries. Determined governance, political and economic uncertainty due to insufficient capital is generally encountered in developing countries. In addition, FDI can be useful for exchanging information, marketing experience, management skills and various market access opportunities. The theoreticians found that inequality is a fundamental reason for division of labour worldwide. FDI can thus create barriers to development and increase income inequality, which can have an adverse effect on long-term economic growth. The adverse correlation between FDI and economic growth may also have a variety of other explanations. The main reason is that foreign investment will reduce the domestic firms ' production levels by market competition[4]. Foreign companies usually face lower marginal costs due to their company-specific advantages, which allow them to captivate domestic firms ' demand. This raises their prices and reduces the level of production. Another explanation is that foreign companies are not equipped to disseminate business information to domestic companies. This could lead to a negative situation due to outdated technologies and poorly skilled employees in the development of domestic enterprises. The literature has extensively studied the debate about the connection between FDI and economic growth. The empirical results differ, however, around countries based on local human capital,



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infrastructure and domestic foreign investment and trading policies. Throughout academic literature, research focusing specifically on FDIs in the energy and energy market and its effect on development are uncommon.

## VIII. IMPACTS OF FDI ON INDIAN POWER SECTOR

Thanks to its potential to increase sustainable economic growth, FDI targets the power industry. The second set of data analyses identified five potential FDI implications. Cumulative explanations for these five variables from thirty parameter were 70.734% of the variation in the original data set.

- Greater energy efficiency
- Adoption of global best practices
- Renewable sources of energy
- Reduction in demand-supply gap
- Socio-economic development

## IX. CONCLUSIONS

In this paper, the current PESI situation was highlighted and FDI causes for energy, energy, and Indian economy for the period 1990-2019 were empirically analysed. The sector-specific analysis of FDI reveals that the PESI in recent years has earned comparatively more FDI than other economic sectors. Therefore, there was a major gap in previous years in the patterns in energy production and energy usage. The empirical results suggested that the relationship between energy consumption and economic growth was positive in a bi-directional way. It rejects the presumption that energy is unbiased to production. It also shows that decreasing energy consumption patterns could harm economic growth and vice versa. In fact, the results of the study indicate that the long term relationship between FDI and GDP and energy consumption is negative. Alternative sources of investment (without credit) and tax collection and export approaches have been identified. Through investing more money to upgrade energy units, the reduced efficiency of energy units could become stronger. Real investment (excluding loans), efficient management, and cash-flow control may fix the problem of circular debt. To order to exercise oversight of energy security issues, effective security measures must be taken to remote areas. Better governance could help improve the performance of India power and energy sector by employing productive workers and reducing the corruption factor.

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