



RENEWABLE ENERGY-FUTURE OF DEVELOPING COUNTRIES

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Abstract

Throughout India there is a desperate need for energy to power the economies of many countries that have been hampered by overly expensive oil and gas imports and a lack of modern infrastructure to use them efficiently. Things look to be changing, however, with a number of investments in recent years that could see renewable energy take off across

India. After nearly a decade of rapid growth marked by reform and investment, Indias power sector has reached a new period of skepticism. Long-standing concerns about fuel availability, the financial health of state-owned distribution companies (discoms), and land and environmental issues have bubbled back up to the surface. Meanwhile, rising costs could threaten the viability of new projects. Regulatory controls over prices, production, and allocation of fuel are leaving a mark on the energy sector. However, the Indian power sector still holds much promise for its stakeholders. Despite a gloomy short-term picture, the medium to long-term outlook appears to be much more optimistic. This paper examines four trends that will shape the evolution of the Indian power sector over the next decade.

Key Words: Renewable Energy, Developing Countries, Power Industry, India.

1 Introduction

Indias Power Industry Phases

Indias power industry has 3 (three) discrete phases in the past 15 (fifteen years) years thereby bringing remarkable positive changes and negative changes.

Phase I (1995-2003): This phase was marked by slow growth and unsuccessful attempts at reform. Skepticism reigned due to Enrons Dabhol power plant debacle and cynicism about landmark regulations such as the Electricity Act.

Phase II (2003-2010): Most of the past decade was a period of reforms and large-scale investment for the industry, especially in power generation. Skepticism gave way to optimism as the private sector made rapid forays in the industry. This phase brought unprecedented capacity addition, the growth of merchant power, the creation of a national transmission grid, and open access, among other positive developments.

Phase III (2011-present): The exuberance waned in 2011, as long-standing concerns about fuel availability, discoms financial health, land, and environmental issues brought back skepticism. Meanwhile, rising costs are threatening the viability of new projects. The next few years could be painful for the industry, with potential

failures and consolidation for marginal players, before a rebound begins.

Figure 1: Energy use in India

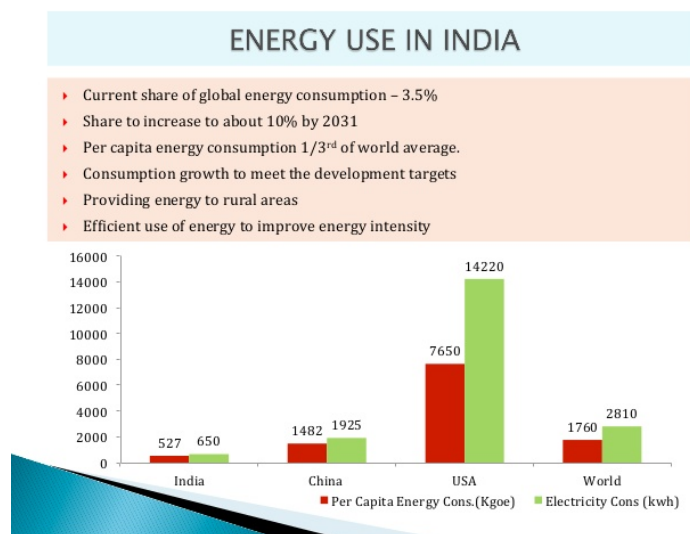


Figure 1: Energy use in India Source: Compiled.

Reforms in the Fuel Sector

India will continue to operate in a subsidized energy regime with government controls on the supply side. Substantial fuel-side reforms will be undertaken, resulting in market forces determining the industry dynamics. Fuel deregulation would raise costs closer to global prices possibly between 50 and 75 percent higher, especially in coal. This in turn would put pressure on generators to pass the cost increase on to distribution companies and customers. Fuel cost increases could put significant pressures on margins. As basic fuel costs increase, especially in thermal coal, more expensive fuels such as liquefied natural gas (LNG) and petroleum coke (or petcoke) will become more viable alternatives. Increased costs for conventional fuel will also significantly reduce the gap in relation to renewable energy, including solar and wind.

Figure 2: Indias domestic consumption targets

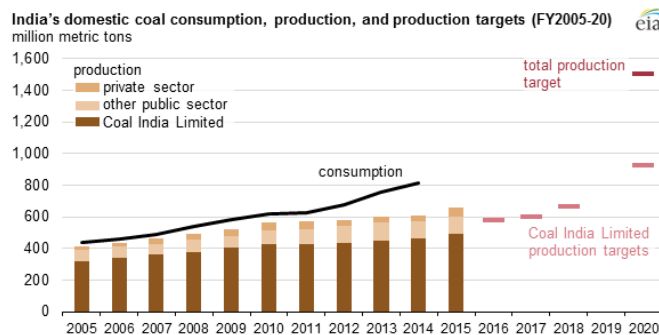


Figure 2: Indias domestic consumption targets Source: Compiled.

The Rise of Renewable Energy

Renewable energy is revolutionary and is dependent on the subsidy. Renewable energy, especially solar, will become a mainstay segment in generation portfolio, without government support, sooner than expected. In the views of experts, renewable energy remains an ultramodern, subsidy-dependent segment of the power sector. However, this is changing. Renewable energy is fast becoming a mainstay in the generation segment.

Figure 3: Indias Renewable Energy Generate & Share

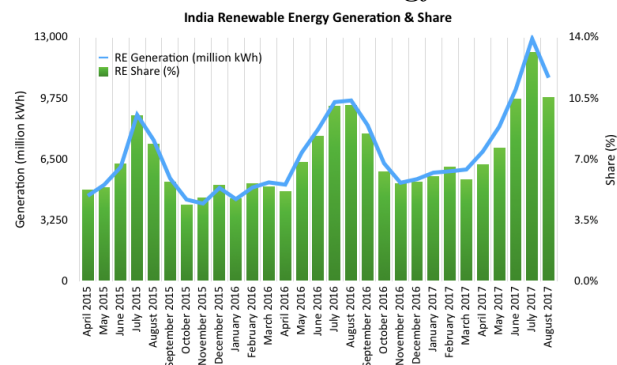


Figure 3: Indias Renewable Energy Generate & Share Source: Compiled.

Several central- and state-level incentives, including tax holidays, capital subsidies, and attractive feed-in tariffs, have driven the growth. Currently, renewable energy contributes to roughly 10 percent of installed generation capacity and 5 percent of total power

production in India. However, the potential of renewable energy has not been fully tapped, even for the most advanced segments (including wind, small hydro, and biomass). Driven by rapidly declining capital costs and the rising cost of conventional power, renewable energy sources such as solar could achieve grid parity much sooner than expected, especially compared with high-cost fuels such as LNG and imported coal.

Figure 4: Energy costs (Rupees per Kilowatt hour)

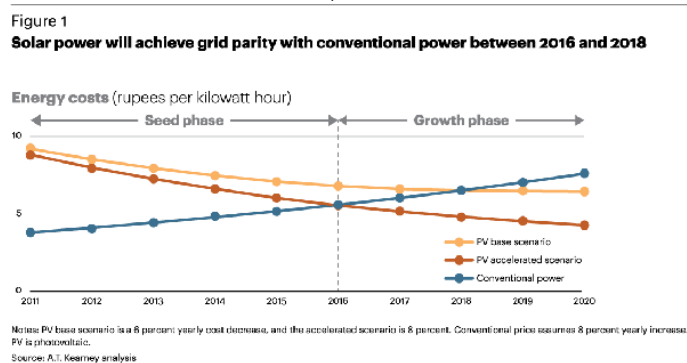


Figure 4: Energy costs (Rupees per Kilowatt hour) Source: Compiled.

Renewable Energy Industry in India

India accounts for approximately 4 (four) % of the total global electricity generated and contributes to 4.43 % to the global renewable generation capacity amounting to 2,011 GW in 2016. On a global basis, The International Energy Agency's World Energy Outlook projects a growth of renewable energy supply to 4,550 GW in 2040. The total renewable power generation installed capacity in the country stood at 103.92 GW, which is 31.2 % of the total installed capacity as of July 2017. Hydro power forms the largest source of energy constituting over 43 percent of the total renewable power generation installed capacity. A hydro power revival policy is in underway which amongst others is likely to include the classification of all hydro power projects as renewable energy.

Figure 5: Installed Capacity

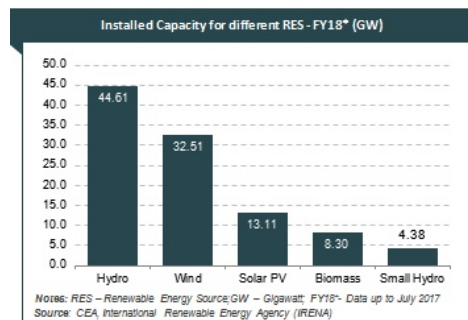


Figure 5: Installed Capacity Source: Compiled.

A Vibrant Retail Market

The power sector works on a push model to generate electricity and transmit to demand centers. End consumers have a limited role. The advent of a vibrant retail market is imminent. This will change the rules of the game to a pull model, where the customers will have increased bargaining power. Indian power customers (particularly industrial and domestic retail) have, to this point, been passive entities in the power value chain. They cross-subsidize systemic inefficiencies and low affordability segments such as agriculture by paying high tariffs. Yet, they continue to face availability and price rise issues. These problems have forced many customers to use expensive and polluting diesel generator sets. Many large users (typically 20 megawatts or more), have set up rather inefficient captive plants, but now even these units face problems pertaining to fuel costs and availability.

The new era of power markets in India will belong to customers, particularly end-consumers. This has already occurred in both developed (such as the United Kingdom and Germany) and emerging markets (such as the Philippines). For example in the United Kingdom, prices dropped 8 to 17 percent for domestic customers and up to 30 percent for commercial customers between 1998 and 2005, as the markets were opened to competition. In Germany, increased competition and market-driven pricing opened up the power markets.

2 CONCLUSION

Renewables can be used for both electricity and heat generation. There is a wide range of renewable energy technologies suitable for implementation in developing countries for a whole variety of different applications, as summarized in table below.

Table 1: Summary of technologies and applications

Renewable energy technology	Energy service/application
Wind – grid-connected and stand-alone turbines, wind pumps.	Supplementing mains supply. Power for low to medium electric power needs. Occasionally mechanical power for agriculture purposes.
PV (solar electric) – grid-connected, stand-alone, pumps.	Supplementing mains supply. Power for low electric power needs. Water pumping.
Solar thermal – grid-connected, water heater, cookers, dryers, cooling.	Supplementing mains supply. Heating water. Cooking. Drying crops.
Bio-energy	Supplementing mains supply. Cooking and lighting, motive power for small industry and electric needs. Transport fuel and mechanical power.
Micro and pico hydro	Low-to-medium electric power needs. Process motive power for small industry.
Geothermal	Grid electricity and large-scale heating.
Village-scale	Mini-grids usually hybrid systems (solar-wind, solar-diesel, wind-diesel, etc.). Small-scale residential and commercial electric power needs.

Table 1: Summary of technologies and applications Source: Compiled.

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