ISSN: 2456–5474 RNI No.UPBIL/2016/68367 Vol.-6* Issue-9* October (Part-1) 2021
Innovation The Research Concept

India's Increasing Economy and its Appetite for energy: A Critical Study With Focus on Renewable Energy

Paper Submission: 10/10/2021, Date of Acceptance: 20/10/2021, Date of Publication: 22/10/2021

Priya Singh
Assistant Professor,
Dept. of Economics,
Govt. PG College,
Noida, U.P., India

Abstract

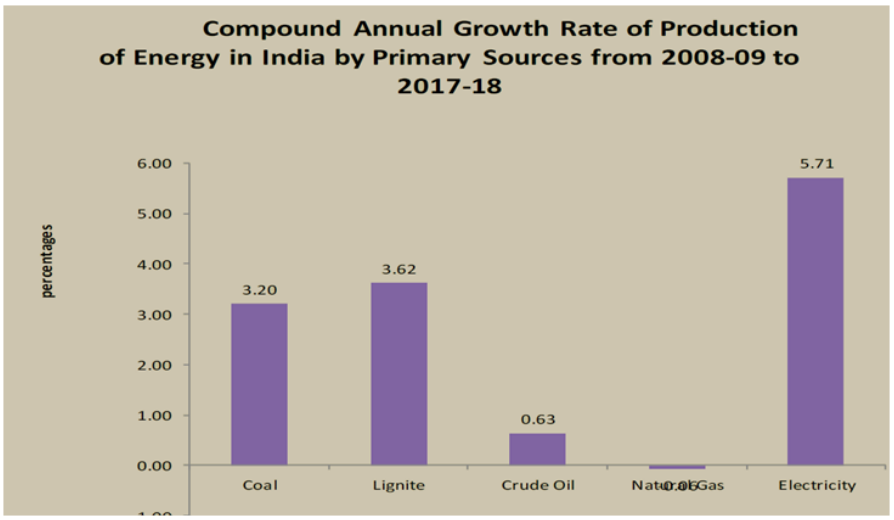
Energy is a vital for component for development and prosperity of any economy. India, however, is lagging behind significantly in energy usage: despite its accounting for 18 per cent of world's population, India uses only around 6 per cent of the world's primary energy. Energy poverty is pervasive in India than income poverty: as 53 per cent of its population could not access clean cooking gas in 2017 when compared to 30 per cent of that for China, four per cent that for Brazil and less than one per cent that for Malaysia. At an increase of per capita energy consumption by 2.5 times, India should be able to increase its real per capita GDP by US$ 5000 (in 2010 prices). Also, if India has to reach the HDI level of 0.8, it has to increase its per capita energy consumption by four times. India's persistent emphasis on energy efficiency over the decades has helped it significantly in serving the it's energy needs. Energy efficiency programmes have led to a reduction of about 110 million tons of CO2 emission in 2017-18and has generated cost savings worth more than 50,000 crores. Where the share of renewable energy in total energy generation has increased from 6 per cent in 2014-15 to 10 per cent in 2018-19, India still needs have increased investment in renewable energy more than US$ 250 billion over the next decade.

Keywords: Energy Consumption, Energy Intensity, Per Capita Energy Consumption, Thermal Energy Consumption, Energy Intensity, Renewable Power, Grid Interactive Renewable Power, Energy Intensity of GDP.

Introduction

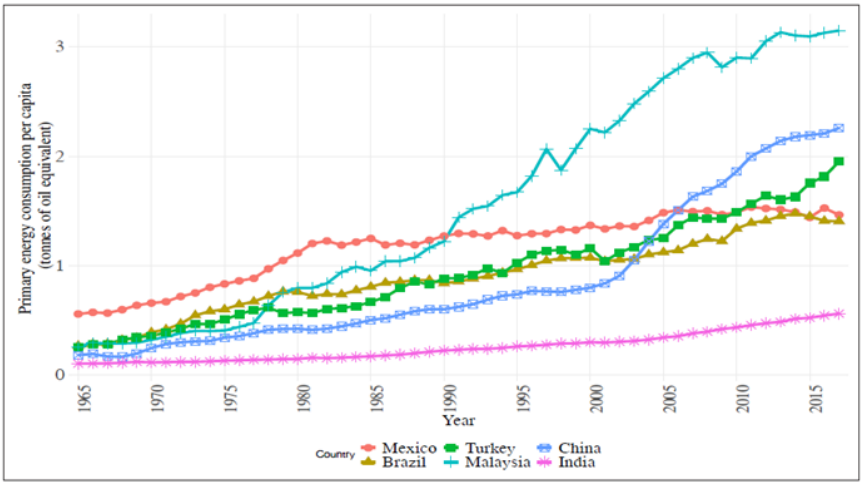
The Union Budget 2019 has come up with an ambitious plan and massive roll out for targets for new government. With the GDP growth rate at 7.3% and population of 133 crore; any illustrative strategy will consume energy to give shape to plans formulated by the Government for betterment of its citizens. Energy has been universally recognized as one of the most important input for economic growth and human development. There is a strong two-way relationship between economic development and energy consumption. On one hand, growth of an economy, with its global competitiveness, hinges on the availability of cost-effective and environmentally benign energy sources, and on the other hand, the level of economic development has been observed to be dependent on the energy demand. Energy intensity is an indicator to shows how efficiently energy is used in the economy. India's energy intensity is also much higher than the emerging economies. Energy is an integral component of the growth process for any economy. The present day developed countries pursued a path of energy-intensive industrial growth to reach the standards of living witnessed by them today. The upper-middle-income countries have also seen per capita energy consumption rise with their rise in per capita incomes. Though India accounts for around 18 per cent of world's population, it uses only around 6 per cent of the world's primary energy. India's per capita energy consumption equals 0.6 tonnes of oil equivalent (toe) as compared to the global per capita average of 1.8 toe. India's per capita primary energy consumption lags that of the upper-middle income countries by a considerable margin.

India's efforts to use energy efficiently needs have been complemented by in the last three decades. The overall electricity savings because of adoption of these energy efficiency measures is estimated at 7.21 per cent of the net electricity consumption in 2017-18. The total thermal energy saved is 2.7 per cent of the net thermal energy consumption and 2.0 per cent of the net energy supply during the same period. In future, India has also to strive to increase the share of energy from sustainable sources.



The Energy intensity of India's GDP has been declining in the recent past, which is reflective of increases in the efficiency of energy use. But; India cannot become an upper-middle-income country without rapidly increasing its share of the global energy consumption pattern commensurate with its share of the global population, and Ensuring the universal access to an adequate modern commercial energy at affordable prices.

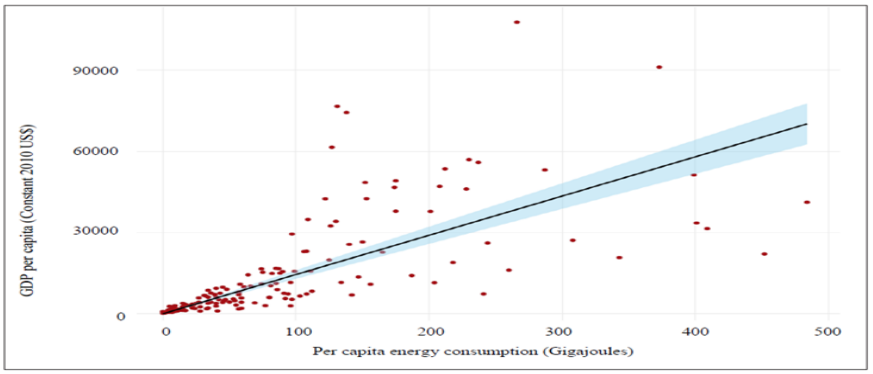
Per Capita Primary Energy Consumption (1965-2017)



Source: Data on primary energy consumption from BP Energy Statistics, Population and Per-capita real GDP from World Bank Data

For the medium term, to India to achieve per capita GDP comparable to as that of the upper-middle income countries, it will require greater number of energy resources and at a rapidly increasing rate. It is also pertinent to note that India's energy intensity of GDP has started declining at a much lower level of per capita GDP as compared to the developed world. As India's primary energy intensity of GDP has started declining since 1991 at per capita GDP of around US$ 578 while US primary energy intensity of GDP started declining since 1970 at per capita GDP of around US$ 23,309 (at a constant 2010 US$).

Per capita energy consumption and per capita GDP for various countries (2017)



Source: Data on Per capita energy consumption from BP Energy Outlook 2019 and per capita GDP at constant 2010 US$ from World Bank Data.

India's almost 60 per cent of installed capacity is in thermal power output of which the main component is still the coal based thermal power plants. Country's Nationally Determined Contribution (NDC) under the Paris Agreement clearly states that India will achieve 40 per cent installed capacity of power from non-fossil fuels by 2030. Though, there has been a tremendous increase in the renewable energy capacity, the fossil fuels, especially the coal, would continue to remain an important source of energy. Again, it may not be advisable to effect such a sudden abandonment of coal based power plants without complete utilization of their useful life as it would lead to stranding of assets which can have further adverse impact on the banking sector. Also, considering the intermittency of renewable power supply, unless sufficient technological breakthrough in energy storage happens in the near future, it is unlikely that thermal power can be easily replaced as the main source of energy for a growing economy such as India. As such, base load power would have to be continued to be provided by the thermal power plants.

As per declared the sustainable energy objectives of the country and the importance that coal based power plants entail, there is a significant need for building capacity for cleaner and more efficient coal technologies. What is also important is the economy's ability to generate greater output from available energy resources and its resource endowments.

A comprehensive energy policy should take into consideration the economies of both coal and renewable as they are interdependent. As they are substitutes for each other as a source of energy but at the same time they are complementary in keeping the flow to grid stable as coal excavation represents a stable source of power while renewable energy may be variable.

Thus, progressively declining costs, improved efficiency and reliability have made renewable energy an attractive option for meeting the energy needs in a sustainable manner and helping India pursue its low carbon development pathway. In this regard, India has been undertaking one of the world's largest renewable energy expansion programmes in the world. The share of renewable energy is progressively increasing in the Indian electricity mix. The share of renewable (excluding hydro above 25 MW) in total generation was around 10 per cent in the year 2018-19 compared to around 6 per cent in 2014-15. Now globally India stands 4th in wind power, 5th in solar power and 5th in renewable power installed capacity. The cumulative renewable power installed capacity (excluding hydro above 25 MW) has more than doubled from 35 GW on 31 March 2014 to 78 GW on 31 March 2019.

In addition, around 27 GW renewable power capacity is under installation and over 38 GW under bidding. The target is to achieve an installed capacity of renewable based power of 175 GW by the year 2022.

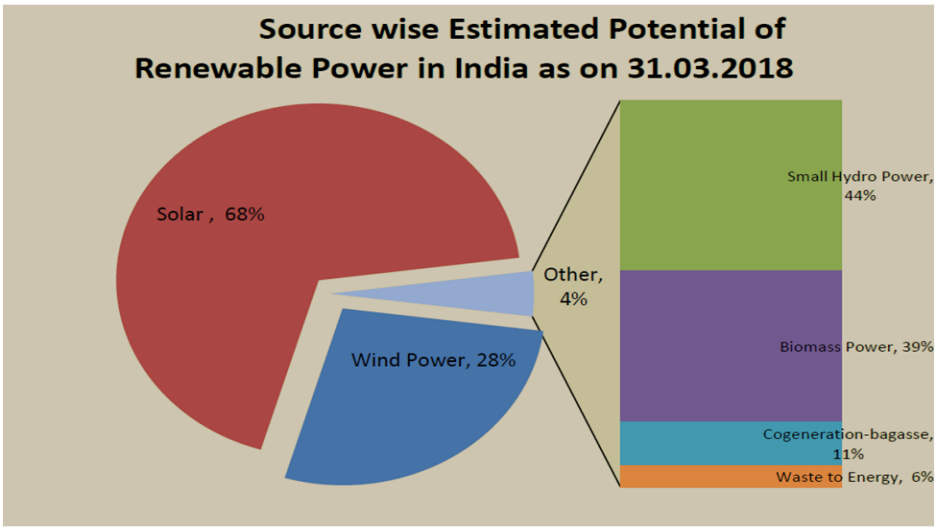
Increasing vehicle ownership has also meant that the demand for the fossil fuels for these vehicles has also increased. Given the large import dependence of the country for petroleum products, it is imperative that there be a shift of focus to alternative fuels to support our mobility in a sustainable manner. While the government has given an impetus to the promotion of quality public transport, especially through the introduction of metro projects in various major cities, a shift to electric mobility in road transport can lead to beneficial results. India could also emerge as a hub for manufacturing of such vehicles.

Potential of Renewable Energy

India has set ambitious targets for renewable energy and has been undertaking one of the world's largest renewable energy expansion programmes in the world. Now, globally India stands 4th in wind power, 5th in solar power and 5th in renewable power installed capacity.

While increasing access to energy is important, it is also imperative that this comes at much lower costs to the environment than it has happened historically in advanced economies. As observed above, there has been arguably a transformation in the energy mix in India. Renewable energy sources are a strategic national resource. Harnessing these resources is a part of India's vision to achieve social equity and energy transition with energy security, a stronger economy, and climate change mitigation. Union Budget 2018-19 announced zero import duty on components used in making solar panels to give a boost to domestic solar panel manufacturers. Government has also offered various financial incentives for offgrid and decentralized renewable energy systems and devices for meeting energy needs for cooking, lighting and productive purposes. While going through the statistics of grid interactive renewal power, the renewable energy which is commercially used are as below:

1. The total installed capacity of grid interactive renewable power, which was 57244.23 MW as on 31.03.2017, had gone up to 73351.81 MW as on 31.10.2018 indicating growth of 28% during the period.
2. Out of the total installed generation capacity of renewable power as on 31.10.2018, Wind power accounted for about 47.7%, followed by Solar power including roof tops (33.1%) and Biomass power (13.0%).
3. Karnataka had the highest installed capacity of grid connected renewable power (12933.23 MW) followed by Tamil Nadu (11899.34 MW) and Maharashtra (8779.87 MW), mainly on account of wind and solar power.
4. As on 31.10.2018, out of total number of Biogas plants installed (49.57 lakh), maximum number of plants installed were in Maharashtra (8.99lakh) followed by Andhra Pradesh (5.49 lakh), Karnataka (4.90 lakh), Uttar Pradesh (4.41 lakh) and Gujarat (4.33 lakh).
5. As on 31.3.2018, a total of 5,97,121 villages were electrified (Table 2.7) accounting to 99.9% of the total villages in the country.



Thus, progressively declining costs, improved efficiency and reliability have made renewable energy an attractive option for meeting the energy needs in a sustainable manner and helping India pursue its low carbon development pathway. In this regard, India has been undertaking one of the world's largest renewable energy expansion programmes in the world. The share of renewable energy is progressively increasing in the Indian electricity mix. The share of renewable (excluding hydro above 25 MW) in total generation was around 10 per cent in the year 2018-19 compared to around 6 per cent in 2014-15. Now globally India stands 4th in wind power, 5th in solar power and 5th in renewable power installed capacity. The cumulative renewable power installed capacity (excluding hydro above 25 MW) has more than doubled from 35 GW on 31 March 2014 to 78 GW on 31 March 2019.

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Way Forward

As there is a lose link between energy consumption and various social and economic indicators, which attain even greater importance. Energy is the spine of the development process of any economy. As compared to the income dimension of poverty, its energy dimension is even more severe. Government of India has initiated a big step in the form of the Pradhan Mantri Ujjwala Yojana, providing access to around 7 crore households under the scheme. The task now is to ensure that households with LPG continue to use the clean fuel for cooking purposes through continued refilling. In terms of household electrification, India has achieved almost 100 per cent with electrification of 21.44 crore households.

Not only does India have to meet the energy needs of the future, it has to do so in a more sustainable manner. While renewable energy capacity has been expanded manifold, fossil fuel based energy is likely to continue to be an important source of power. Overall, energy efficiency is a strategy that can lead to a win-win situation through better utilisation of energy resources. Future policy direction should orient itself to Enabling Inclusive Growth through Affordable, Reliable and Sustainable Energy enhanced energy efficiency programmes in different sectors of the economy as well as technological solutions to better utilise the natural resource endowments of the country for greater prosperity.

Aim of the Study

With the change in geo-politico- economic situations which is inextricably attached with energy, where not only the political and economic situations are affected but also the life style of entire population is put in the way of hurricane. The aim of this paper is study as how the energy consumption is changing not only per capita but also in diversity of energy. The paper attempts to establish a correlation of energy and economic conditions of population in Indian context.

Conclusion

To conclude, India's economic future and prosperity is dependent on her ability to provide affordable, reliable and sustainable energy to all her citizens. CHAPTER AT A GLANCE

India with its per-capita energy consumption of just about one-third of the global average shall have to increase its per capita energy consumption to at least 2.5 times to increase its real per capita GDP by $5000 per capita, in 2010 prices, so as to enter the upper-middle income group.

Additionally, if India has to reach the HDI level of 0.8, which corresponds to high human development, it has to quadruple its per capita energy consumption.

Energy efficiency programmes in India have generated cost savings worth more than `50,000 crore and a reduction in about 11 crore tonnes of CO2 emission.

The share of renewables in total electricity generation has increased from 6 per cent in 2014-15 to 10 per cent in 2018-19 but thermal power still plays a dominant role at 60 per cent share.

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