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A Study of India's Energy Scenario: Journey from Conventional to Renewable Energy

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Abstract: ***Energy one of the most important fuel for the economic growth and development of the nation. Economic development and energy consumptions are two sides of the same coin. Since India is a developing country, any uncertainty in supplying the energy can hamper the socio-economic development of the nation. To make the nation a balanced one, more importance to be given in electricity generation in the next decades. This paper presents a basic review of past as well as current energy generation scenario in India i.e. a journey for energy generation from conventional source to renewable source of energy.***
Keywords: Energy, conventional energy, renewable energy, installed capacity, electricity generation growth

I. INTRODUCTION

Energy intensity is an indicator to show how efficiently energy is used in the economy. The energy intensity of India is over twice that of the matured economies, which are represented by the OECD (Organization of Economic Co-operation and Development) member countries. India's energy intensity is also much higher than the emerging economies—the Asian countries, which include the ASEAN member countries as well as China. As per primary energy consumption record with 1031 billion units (between April'17-Jan'18) electricity production per year, India is among the top five in the world. In India the population as well as economy is growing very fast which also causes fastest energy consumption. So it is high time and should be first priority to work on nation's energy independency. [1][2]

II. INSTALLED CAPACITY

A. For Different Sectors

As on 28.02.2019, the installed power generating capacity in our country 350162 MW including all state, public and private sectors where state sector contributes 24.2%, central sector contributes 29.7% and private sector contributes 46.1% of the total installed capacity. [3]

TABLE I: Installed Capacity For Different Sectors In India

Sector	Total installed capacity (MW)	% of total installed capacity
State	84,637	24.2%
Central	104,039	29.7%
Private	161,487	46.1%
Total	3,50,162	100%

B. For Different Sources

Out of the total installed capacity, 222.927 GW came from thermal sources like coal, lignite, gas and oil out of which coal contributes the most. Moreover 45.399 GW came from hydro, 6.780 GW came from nuclear sources and 74.082 GW came from Renewable Energy Sources like Small Hydro Project, Biomass, Waste Power, Solar and Wind Energy etc.
Installed Capacity for different sources in India as on 28.02.2019 considering both the conventional as well as renewable energy sources are listed in the table II. [3]

Table II: Installed Capacity For Different Sources In India

Source	Installed capacity (GW)	Total %
Thermal	222.927	63.7%
Coal	191.093	54.6%
Lignite	6.26	1.8%
Gas	24.937	7.1%
Oil	0.638	0.2%
Hydro	45.399	13.0%
Nuclear	6.780	1.9%
RES (MNRE)	74,082	21.2%
Total	350,162	

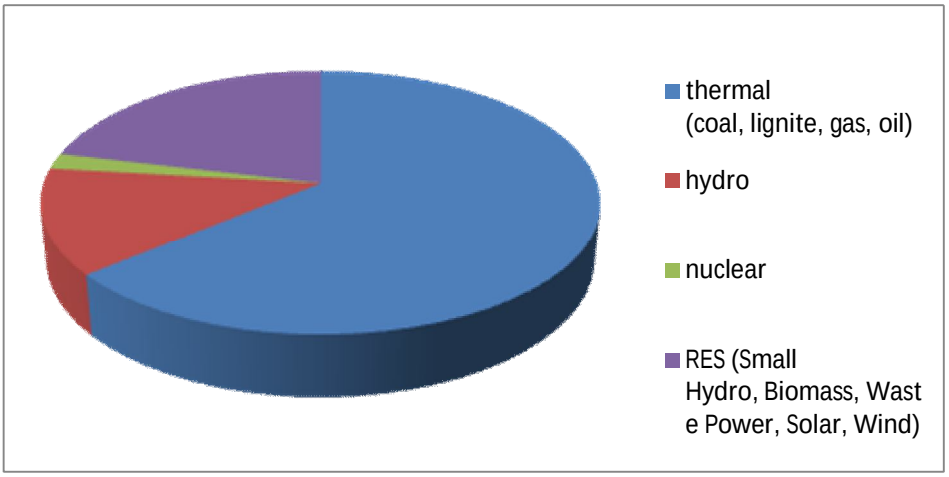

Fig. 1 Comparison of installed capacity in India (as on 28.02.2019)

C. Growth (%) of Installed Capacity

The % of growth of the installed capacity considering both the conventional and renewable energy sources are tabulated in table III and the pictorial representations of the total capacity installed and the growth % are shown in figure 2.

TABLE IIII : Growth Of Installed Capacity

Year	Total Installed capacity (conventional + Renewable) (in GW)	Growth % of Installed capacity
2014-15	272.5	-
2015-16	280.3	2.86
2016-17	326.84	16.60
2017-18	344	5.25
2018-19	356.1	3.51

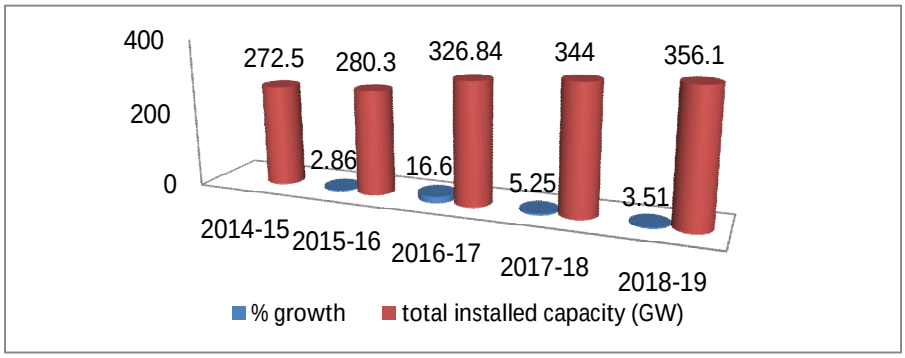

Fig. 2 Overview of installed capacity using both conventional and renewable energy sources in India

III.ELECTRICITY GENERATION

A. Electricity Generation and Growth Using Conventional Source

The electricity generation from conventional sources like thermal, hydro, nuclear etc. in the year 2015-2016 was 1107.822 Billion unit (BU) over previous year's generation of 1048.673 indicating a growth of about 5.64% and thus the table shows a fluctuating growth of electricity generation from conventional sources. Moreover the generation for the year 2018-2019 is found to be 1141.988 BU up to Feb-2019 against the target 1265 BU.[3]

The conventional energy generation for the last for years including the current year is shown in table-IV

TABLE IIIV: India's Electricity Generation And Growth Using Conventional Source

Year	Energy Generation from Conventional Sources (BU)	Growth %
2014-15	1048.673	8.43
2015-16	1107.822	5.64
2016-17	1160.141	4.72
2017-18	1206.306	3.98
2018-19	1141.988	3.77

B. Electricity Generation and Growth Using Renewable Source

The electricity generation from renewable sources like in the year 2015-2016 was 65.78 Billion unit (BU) over previous year's generation of 61.78 BU indicating a growth of about 6.47%. Similarly, a total of energy generated in 2017-2018 was 101.83 BU as compared to the 61.78 BU generated in the year 2014-2015 indicating an increase of about 65% in the four years duration Thus the % growth of renewable energy generation is increasing in a healthy pace which is a positive sign in the field of renewable energy. Year wise details of energy generation and growth using renewable sources are listed in table-V

TABLE V: Renewable Energy Generation And Growth

Year	Energy Generation from Renewable Sources (BU)	Growth %
2014-15	61.78	-
2015-16	65.78	6.47
2016-17	81.54	23.96
2017-18	101.83	24.88
2018-19	126.75	24.47

Year wise details of energy generation and growth using conventional and renewable energy sources are represented in Fig.3 and Fig.4 respectively.

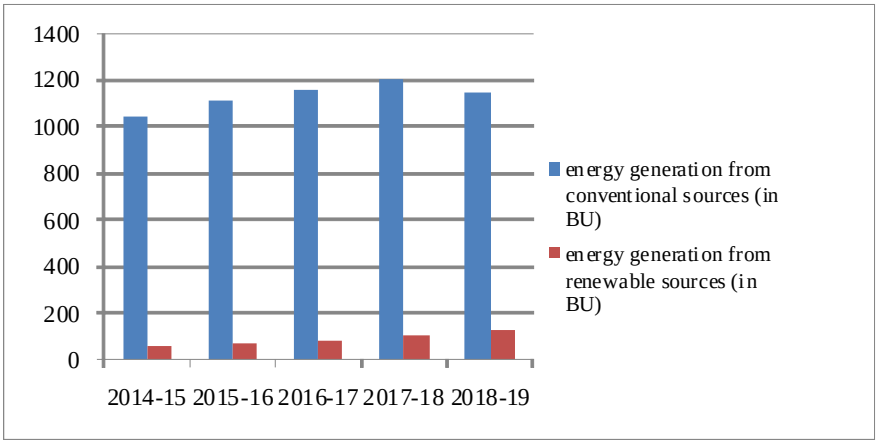

Fig. 3 Year wise comparison of conventional and renewable electricity generation in India

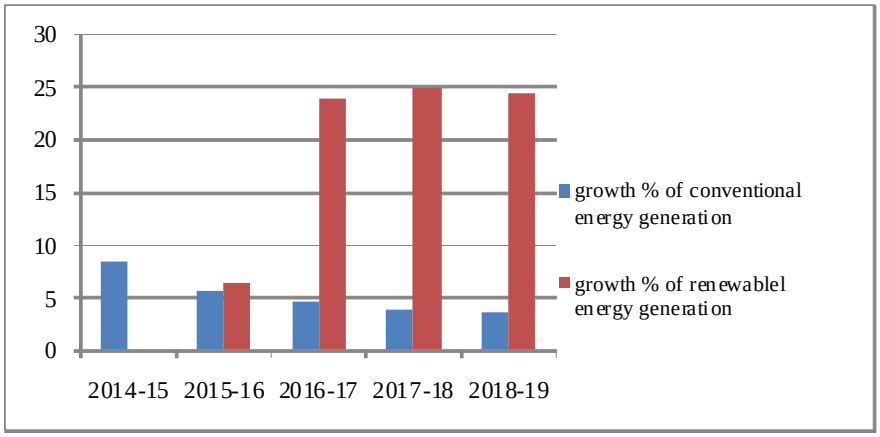

Fig. 4 Year wise comparison of growth % of conventional and renewable electricity generation in India

C. Share of Renewable Energy in Terms of Overall Energy Generation

The electricity generation from renewable sources shared 5.89% of total energy generated in India in 2014-2015which has reached around 11.1% in 2018-2019. Year wise details of share of renewable energy for five years are listed in table-VI show the impact of renewable energy in Indian energy scenario for last few years and it proves that with increasing and continuous focus on renewable energy, India has the potential to become one of the world's leading producers of renewable energy.

TABLE VI: Renewable Energy Generation And Growth [3] [5][6]

Year	Energy Generation from Conventional Sources (BU)	Energy Generation from Renewable energy Sources (BU)	% share of renewable energy source
2014-15	1048.673	61.78	5.89
2015-16	1107.822	65.78	5.93
2016-17	1160.141	81.54	7.02
2017-18	1206.306	101.83	8.44
2018-19	1141.988	126.75	11.1

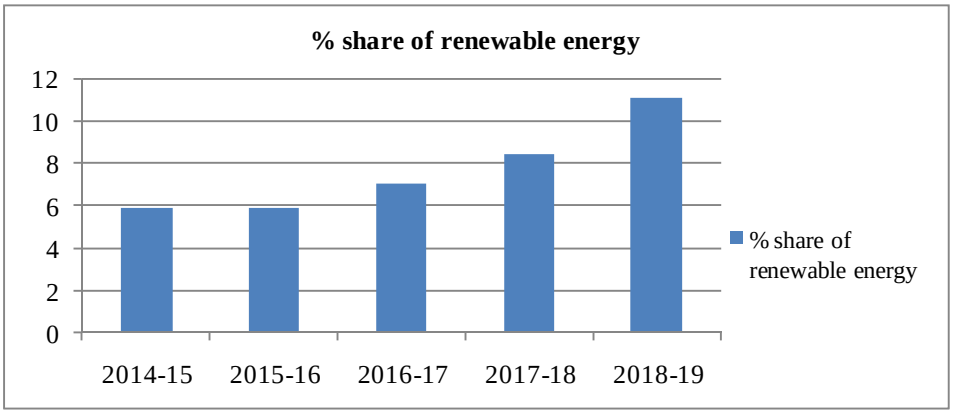

Fig. 5 Year wise share of renewable energy in terms of overall energy generation in India

IV. JOURNEY TOWARDS RENEWABLE ENERGY SOURCE

India formed the first ministry of non-conventional energy in the world and since then India is trying to focus on the use of renewable energy and thus gradually adopting the renewable energy techniques in increasing manner whose impact is quite visible during the last few years in Indian energy scenario.[5]

As time passes by, people come to know about the importance of the renewable energy which will play a vital role to mitigate the energy gap in developing country like India and to develop a sustainable path of energy supply which will make the globe clean, green and safe. India has also set a target of achieving 40% of installed capacity of power generation shall be based on clean energy sources and determined to install renewable energy of 175 GW by 2022. [4][5]

V. CONCLUSION

The conventional source of energy more likely to exhaust with time and the emission of green house gases due to use of conventional source has polluted the atmosphere to a great extent. So to make the planet safe, healthy and green, it is high time to use renewable energy sources which are free of cost and abundant in nature and can solve the long standing energy problems faced by developing country like India in near future. As India is blessed with plenty of renewable energy sources like wind energy, solar power energy, hydro power energy, geothermal energy, tidal energy and biomass energy etc, the energy needs that is going to be 3-4 times in near future than the current energy needs can be met by adopting renewable energy techniques. Thus India is taking the positive step towards clean, green and more sustainable future which is also an alternative to exhausting conventional energy sources.

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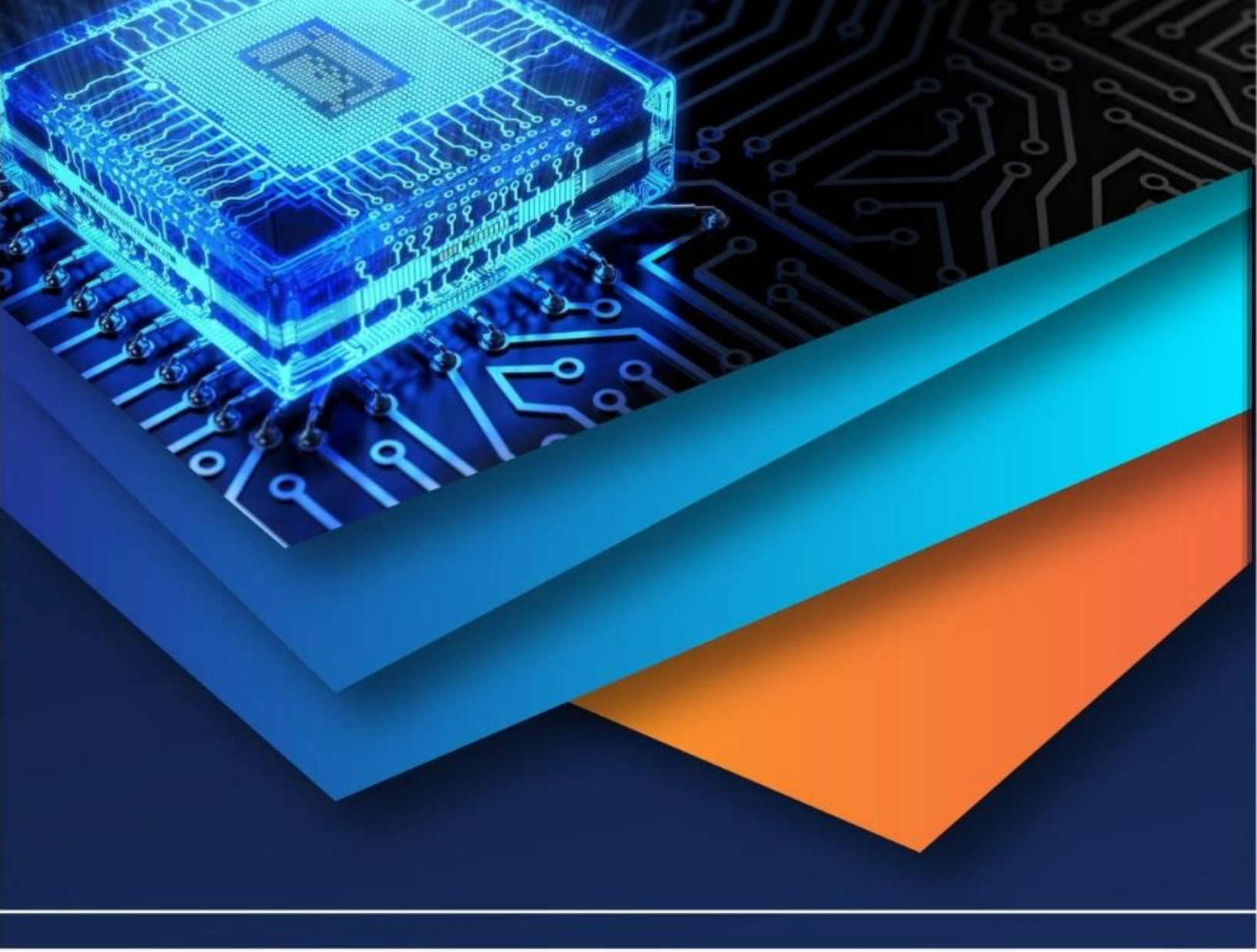

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