

# India Energy Sector and Its Opportunities

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**Abstract-** Indian economy is one of the world's fastest one in spite of the fact that it is not endowed with abundant conventional energy sources, along with it many kind of challenges are their inflation has the largest share among them.

With the devaluation of rupee in 1991, which yells the inflation of 13.8% added by the economic crisis of 1991, has badly affected the Indian economy [1].

But now due to many new initiative taken up by govt. and their increased effort Indian economy displayed a signs of high economy growth with a growth rate of 7.1% GDP in 2016-17[2].

In India due to industrialization and govt. policy like make in India, smart city, and heavy emphasis on micro and small scale industries the amount of energy consumption has increased, thus it is necessary to find out the relationship between the energy prices source and its effect on inflation

India has 0.5% [3]of the oil and gas resources in the world containing 17% [4]of the world total population and it make India heavy dependent on the import for fulfilling its oil and natural gas demand this is Due to the limited availability of energy source especially oil and gas and their continuous increase in energy demand, import dependence is continued to rise and it is estimated that by the end of 2017 total import dependence for crude oil increased by about 8.01 % [5]of the total consumption.

Total oil consumption growth for 2016 in India takes place at 5.3% [6]as the govt. has not made any breakthrough in the renewable energy, oil and gas would continue to hold a key importance in the Indian economy. But apart from it India will remain the least explored countries in the world at a well density of about 20 per 1000 km<sup>2</sup> [7]and out of the total the 26 sedimentary basin only eight have been explored[9] so for and all these make India a desired destination in term of opportunities

Due to the govt. policy of distributing oil and gas in India with heavy subsidy, it create a huge deficit, as their price move up or down inflation also follow the same pattern, which adversely effect the society especially the middle class and lower middle class family due to their increased cost of living. The main reason behind it is oil price because it is an major input

to our economy it is used in various activity which directly or indirectly effect the economy activity such as transportation, industrial purpose, for heating purpose – and definitely if input cost price rises the end product cost would ultimately rise.

In India energy sector is mainly govt. dominated and characterized by relatively low competition. However after the economic reform in 1991 many companies have entered into the energy sector but they find it difficult to make their presence against the pre - dominated govt. established PSU [10].

I have taken economic impact of the renewable energy relationship with Indian economy, which has a significant effect in our daily life also.

## I. INTRODUCTION OF INDIAN ECONOMY

Since our independence India is a planned economy and the first few plans are mainly focused on strengthening of the agriculture, industrial and manufacturing sector to form the backbone of emerging India along with social development and to eradicate the problem of poverty and unemployment.

Indian economy is tenth largest in the world in terms of nominal GDP and it ranked third by PPP basis this is all because of some strict economy reform and adopting of LPG (liberalization, privatization, and globalization) taken by the government of India in 1991[11] when the economy is in its most critical situation, more then two decades have passed since then, now India is the sixth largest manufacturing country in the world rising from his previous ninth position in the year 2016[12] and setting up new benchmark in every corner of the world for its rapid growth rate.

In the recent month indian economy has seen some far reaching change which would definitely boost the growth of economy in long term, some of the tough decision taken by the present govt like demonetization and passing of GST bill, both the steps taken by the government will be helpful in growth of indian economy, through demonetization

govt has strained to remove the unaccounted money from system due to this it has also boosted the digital economy however after certain turmoil everything has settled down to normal leading the economy growth more faster . GST is an another attempt of indian govt to pave the way of unified market with single taxation system, in spite of implementing some vigorous decision by the govt indian economy is still growing at unexpectedly robust growth of around 7%[13] and thus it will retain its tag of having fastest growing economy In the world.

In current scenario Indian economy is mainly affected by fuel price due to its heavily reliance on importing crude oil from other countries which ultimately create a huge deficit on country economy, with the implementation of GST it has added pressure to the economy which ultimately rise the inflation rate in November 2017 it is about 3.58% as compared to 3.17%[14] in January. Fiscal deficit as the percentage of GDP would be about 3.2% for the session 2017-18 as compared to 3.5% in the session 2016-17

Due to better GOVT policy and its inclination toward attracting the investment more and more FDI in India grow at about 30% in 2017 to touch \$60 billion, which was about \$46 billion in 2016, India forex reserve also increased by \$1.2 billion to \$364.01 billion in the year 2017 [14].

There is an increase in the total food grain production in the country to about 271.98 million tones which is about 6.94 million tones higher then previous record production of about 265.04[11] million tones in the year 2016 this is because of very good rainfall during the monsoon of 2017 and many major initiatives taken up by the government toward the development of agriculture field.

Apart from it a number of new policy reforms along with several initiative has been has been started by the government such as make in India, skill India, digital India, clean india which would be helpful in advancement the eminence of life in rural and urban area along with creation of new job opportunities and a rapid development in the infrastructure, these steps has also increased the opportunities of investment in the country.

Reform such as road building target of 40 km per day for better connectivity through out the nation construction of highway has been increased by 50% in the current fiscal year 2017 and a daily target of

about 9.5km [9]rail network will definitely boost our economy with a lot of new investment opportunities but due to all these demand of power will also be increased. Govt has highly emphasized on make in India and a push toward attracting foreign companies to invest in manufacturing sector remain in central,

## II. NON - RENEWABLE ENERGY SECTOR IN INDIA

India is the third largest energy consumer in the world exceeding china and united state out of the total energy consumed oil and gas account for about 35% [7]which show its heavy reliance on non-renewable energy source which is also necessary for us in the current scenario and consumption rate are estimated to be increased in the near future because still in many part of the country it is even a dream for them to see electricity thus at least in the upcoming few years we would see a hike in the consumption of electricity in India and as the living standard will improve their will be an increase in the demand of other consumable good which lead to higher demand of energy in many different industrial sector , as India is on the path of rapid economic evolution along with the rapid overall development , definitely would need at least 2-3 [8]times more energy then the total energy consumed today to meet the energy requirement of such a fast growing economy

As to maintain the sustainable development of any nation energy is one of the most important building block and a key factor in its growth being a developing country our energy sector is still In its growth stage and it is estimated to grow at about 7.1% in the year 2017-18 and power consumption in the country is expected to rise from 1127 TWH in the flying year 2017 to about 1640 TWH in the year 2022 [3].

India being a fastest growing economy in the world with a sustainable GDP of about 7.1% in the year 2017 and to retain its position of leading developing economic in the world along with achieving its vision of becoming superpower in the globe, toward achieving its goal of make in india project and to meet the demand of ongoing rapid development in the country we need instantaneous solution for energy demand which can be possible only through non renewable source as other source need huge investment along with its uncertainty in the operation

make it unpopular to emerge as a global power & to meet its ongoing demand we would need more and more energy which can meet the overall demand ,in india energy would remain a crucial factor for its economic advancement and to maintain its sustainable development .along with its assurance of providing efficient ,reliable , affordable, and clean energy in the country for its growing demand.

Oil and gas sector in india is one of the eight core industries and it play a major role while taking decision for other industries of the economy due to increasing infrastructure development and government initiative like make in India, made in India, energy demand is estimated to increase which in turn would increase the oil and gas demand in the country in order to become self reliant government has decide to reduce its import which is about 77% in the year 2017 of the total crude oil to about 67% up to the year 2022,[5] to make this long term goal feasible a lot of new initiative has been taken up by policy maker to attract investment and to make business ease. Sector itself contribute to around 15% of Indian GDP.

Many different government starting from the independence has attempted to reduce its dependence on importing oil and natural gas by introducing many policy ,to fulfill the ever increasing gap between demand and supply in the year 1997-98 New exploration and licensing policy (NELP) [7] was introduced to explorer some new and already accessible proven reserve discovered in different location of the country it is estimated that india has twenty six sedimentary basin but out of which only eight are explored until now, which show huge opportunities in the india upstream sector and thus to match the upcoming demand and to make the unmapped sites worthwhile now government has also allowed 100% FDI [1] in many segment of the sector. As for at least in the upcoming few year indian economic growth will remain dependent on energy and with it its growth in demand will ultimately rise thus the sector will remain attractive for the investment.

To fulfill the ongoing increasing demand many new refinery plant has been setup along with the modernization of old plant to match the ongoing increasing demand, india has successfully retain its position of having second largest refiner in Asia, india has an estimate of around 653 million metric

tonnes (mmt) of proven oil reserve [2], 54 trillion cubic feet proven natural gas reserve out of it 34% of the total proven reserve are located on shore and 66% are offshore along with 96 trillion cubic feet of estimated shale gas reserve [9] which still remain to be explored in the upcoming year out of which 60% of prognosticated reserve are yet to be utilized government is also planning to increase regasified liquefied natural gas (RLNG) from 22MMTPA to 47.5 MMTPA in the year 2022 [4] .

Under the make in india inventiveness a number of new initiative has been taken up to remove the obstacle and incentivized the oil and gas sector to promote investment with the aim of minimum government maximum governance & to make investment more easy, as india is enriched by both the fast growing economy and most populated country in the world which are the main driver for demand in the energy sector thus their will be an increase in the demand in indian energy industry at least for the upcoming year.

To increase the ease of doing business sector specific policy like HELP (hydrocarbon exploration & licensing policy) [1] has been formulated to attract private investor in country, due to all these effort some of the private organization has entered into the market making india a net exporter of petroleum products, india has a lot of opportunity in both the upstream and downstream sector along with its potential on LNG terminal petrochemical products and its refinery capabilities govt is also considering its exploration on underground coal gasification. To make india a gas driven economy government is planning to expand their natural gas pipeline network which is at present around 14760 km to increase it to another 15000 km network in upcoming year which would connect a total of 326 cities in different stage of its implementation, project will be completed before 2022 which would definitely increase the demand of natural gas [10].

To meet the ever-growing household demand of safe, clean and affordable form of energy along with maintain energy security govt has also started exploring in the up stream sector to make it viable bidding of different field under the policy of discover the small field policy which was aimed at increasing the production of domestic oil and natural gas in those basin which are already discovered to increase the inland production promptly.

India retail market for oil and gas are mainly governed by public sector oil marketing companies which has its own network of distribution throughout the India for energy supplies, however in the recent year due to change in government policy some private companies has also entered in to the market which would ultimately benefit the end consumer and as the industry would grow with time some new entrants is expected to enter into the market, in 12TH five year plan government has predominantly concentrated on E&P sector to find out new sites along with extensively exploring the existing hydrocarbon reserve and to promoting R&D work and creating indian professional in oil and gas sector govt has established some national institute which would act as a advisory body for their technical and professional need , RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY AT RAEBARELI (UTTAR PRADESH) which work under the edges of national oil companies in various research work and form the workforce for the future upcoming demand in, indian oil & gas sector has acquired an investment of US\$75 billion in between the year 2012-17 [13] this is due to some of the government initiative and its fondness to attract more new investment we can say a lot more is still going to be happen in the indian oil and gas sector and definitely we need to invest in the industry because it can only fulfill the upcoming demand of our fastest growing economy .

### III. EXPLORATION OPPORTUNITIES IN INDIA & ITS MARKET

The current energy demand is on rise with the expansion in socio-economic development in the country but the rate with which energy demand is increasing is more then the domestic production and to bridge this gap between rate of consumption and domestic production it is necessary for us to work on exploration & production opportunities and this is why starting from post independence era govt has enforced in many ways to accelerate exploration and reducing imports of liquefied natural gas and crude oil in the country.

To meet the incremental demand in oil and gas govt has mainly emphasized on E&P with different multi level strategy and some of the major steps taken by the govt in last two decade to provide equal opportunity to all whether, it is national oil

companies or private investor by introducing new exploration & licensing policy (NELP) which was aimed at providing equally lucrative & contract term to all, and CBM policy In the late 90'S, hydrocarbon exploration and licensing policy (HELP) to reassess the profit sharing methodology and this is in tune with govt policy of ease of doing business with minimum governance plan to attract new investor, discovered small field policy to bring small discovered field under production as soon as possible to increase the domestic production, apart from opening opportunities in E&P govt has also introduce new gas pricing formula to incentivize gas production from difficult areas having high temperature high pressure and in deep shallow reservoir by providing them marketing and pricing freedom.

India has a total potential area of about 3.14 million sq. km for oil and gas exploration out of which 1.84 million sq. km is spread across 26 on-shore & on shallow water whereas rest of the 1.30 million sq. km is on deep water to explorer its reserve hydrocarbon vision 2025 was being implemented by NDA regime in the year 2000 according to which 25 percent of the area will be explored by 2005, next 25 percent by the year 2010 another 25 percent before 2015 and finally 100 percent site will be explored before 2025 [8].

Out of the total 26 basin only 7 has been established with commercial production, and 3 basin which are mainly located in Andaman & Nicobar, Mahanadi and Kutch are yet to be commercially utilized, whereas rest of the 16 basin are considered as geologically prospective having potential for the future output but required huge investment. Deep-water basin covered around 41 percent of the total Indian sedimentary area it is also a potential driver for the oil & natural gas production in the country [5] Apart from 15 sedimentary basin & deep-water areas of the country, a number of different independent agencies have estimated that India has shale gas & oil reserves which are mainly located in Krishna, Godavari, damodar, cambay and Cauvery on land. Energy information administrative (EIA, USA) has estimated a total of 584 TCF of shale gas and 87 billion barrel of shale oil, which can be utilized by proper investment in the country.

In India sedimentary basin are mainly discovered during the pre implementation of NELP & are almost two decade old which are done by using geo-scientific data available during that time thus to

explorer new opportunities a multi-organizational team encompassing member from ONGC, OIL & DGH are formed to make hydrocarbon reassessment of all the available sedimentary basin with the help of latest technological data available in hand and the programme will be completed in the year 2017.

To revolutionize the E&P sector govt has taken initiative which was mainly focused on increasing oil and gas exploration in country, attracting investment, making process more transparent, minimum governance and with less govt hindrance to make the process more simple & transparent for both the domestic and foreign investor.

India basin need intensive exploration effort for lifting crude oil and gas supply in the country and up to now hydrocarbon potential has been obtained wherever exploration efforts has been taken on various sedimentary basin of the country, until now only 48 percent area of the sedimentary has been assessed which shows that still more then 50 percent of the indian sedimentary basin are undiscovered, a lot more opportunities are available in the sector and it also become very attractive due to govt preference to make it viable and open for all thus we can say indian E&P sector will see a growth in near future.

#### IV. RENEWABLE ENERGY INDUSTRY IN INDIA

In order to meet the growing energy demand of Indian economy while reducing the dependence on limited natural resources we need to focus on renewable energy sources which would also be helpful in decreasing the greenhouse gases emission and maintaining the climate change which has caused worldwide concern. Their will be an increase of average temperature by almost 1 to 2 degree if we continue to use the non-renewable source of energy with the current pace before the end of this century. Out of the total carbon dioxide emission developed nation has the largest share but the current trend with which developing nation are moving toward energy cultivation it is an alarming one and if it is not checked then it will cause a great harm to our ecosystem thus it is necessary for us to emphasis on non renewable source of energy.

Actually to look on alternative fuels start due to the sudden political change in the oil countries in the late 1970's, which ultimately encouraged nations to take

matter seriously and to emphasis on energy security as an important issue for sustainable development. Energy security is an important factor for economic development and maintaining the industrial growth in the country, thus in order to look for alternative fuel which can fulfill both the criteria of having energy security for sustainable development along with reducing dependence on import began with oil crisis and thus to focus on sustainable source of energy govt has established an commission for additional source of energy (CASE) in the year 1981 under the edges of department of science and technology , CASE is mainly established to promote R&D activities in this area . In the year 1992 a separate ministry for non-conventional energy sources are formed which in the year 2006 changed to ministry of new & renewable energy.

Renewable energy sources will definitely pave the way of sustainable development along with successful enriching the power shortage in the country with boosting the energy security by diversifying the use of fuel source and shrinking the dependence on fossil fuel, within the existing scenario mostly for power sector coal, oil are being used by most of the developing nations and with their rising demand it is an alarming issue for global warming where as, apart from environmental effect fossil fuel is nowhere seams to be lasting for the expected demand , thus to maintain the ongoing demand we have to search for other alternative.

To meet the challenge of making the renewable energy (RE) technologies convenient, efficient, safe and affordable and to promote RE govt is also providing incentive to the investor to influence them to invest in the sector along with subsidizing the instrument necessity for installing the RE GOI is also promoting through make in India initiative to make India a global production centering the field of RE sector. In order to reduce the carbon footprint, increasing global warming and to maintain energy supply along with energy independence lead to the capacity addition through renewable energy source by government effort of promoting, providing incentive for establishing production center and by policy framework supporting for the overall development of the RE and thus most of the investment in there sector is mainly because of govt lead incentive & promotional offer started to

maintain the energy security along with reducing the greenhouse effect.

Govt of India has made a voluntary commitment in the united nation framework convention for climate change (UNFCCC) to reduce its carbon emission intensity by 20-25 percent by 2020 as compared to 2005 and thus in order to achieve its target GOI has launched national action plan on climate change (NAPCC) in the year 2008 and started providing budget support for R&D in the field, promote private investment through fiscal incentives, providing tax holiday and by reimburse return for power fed into the grid.

MNRE has taken many initiate to fructify the clean energy dream along with maintaining climate change issue through policy direction and monitoring the implementation of the policies at various level of its framework, for better flow of policy every state has a nodal department for coordinating the development in the field of renewable energy with central govt beside their own programs, govt has also established various agencies at center and state level which are responsible for implementation of the scheme like state government and state nodal agencies (SNAs) which mainly promote RE technology their conversation measure and formulated the socially oriented scheme for urban, tribal and underdeveloped region, provides aid in the form of subsidy for promoting RE technology and support R&D activates in the light of central and state policies.

Indian RE development agency (IREDA) play a crucial role in the development of a long term renewable energy policy by providing financial support to specific project and scheme for RE technologies in order to conserve energy through energy efficient, IRREDA is an govt institution registered as a nonbanking organization with the reserve bank of India (RBI) in 2008[12].

To promote & accelerate the R&D activities in the sector govt has established national institute of wind energy at Chennai, tamilnadu which would be helpful in the utilization of wind power in the country, a wind turbine test station has also been established at kayathar, tamilnadu with technical and financial support from Denmark govt, national institute for solar energy (NISE) located at Gurgaon, Haryana an dedicated unit to promote the solar technology along

with it govt is also upcoming with SARDAR SWARAN SINGH NATIONAL INSTITUTE OF RENEWABLE ENERGY located at kapurthala [6], Punjab with all these we can say govt is investing in the field of RE for its R&D work and in near future some new achievement can be seen in the sector.

In order to maintain the voluntary commitment that govt of India has done in UNO to reduce its carbon emission density by 20-25 percent by 2020 as compared to 2005, govt has taken many reform, started providing subsidy and also established many institution to promote R&D work in the field along with it indian govt has set a target of 175 GW by the year 2022 which include 60 GW by wind, 10GW from bio-power, 5 GW from small hydro power & 100 GW from solar power set under national solar mission (NSM) which principally comprises of 60 GW from grid connected solar power project & 40 GW through rooftop under various pilot project [13]

## V. CONCLUSION

So in the present indian energy scenario there is need of fulfilling the demand of huge amount of energy in the upcoming year which can only be fulfilled by exploring in to the oil and gas sector however for the long term sustainable growth there is a need of clean and green energy which can be fulfilled by the renewable energy so in the current era we should have to look into both the long term as well as short term goal which can full fill the demand of upcoming society.

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