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# Building a Low Carbon Indian Economy

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**Abstract.** Climate change has bought unprecedented challenges to humanity. The world has witnessed the dark side of climate change in terms of rising sea level and increase in temperature of world. Low carbon emission is the key to minimize the impact of climate change. Widespread significance attached to reduction in carbon emission has given birth to the new notion of low carbon economy (LCE). The LCE suggests sustainable development of economy by minimizing the ecological damage through the adoption of green practices. The countries across the globe are aiming to become LCE. This paper provides insights into the new notion of low carbon economy and how India is moving towards the encouraging path to become low carbon economy to tackle impending climate change and balancing its developmental needs.

**Keywords.** Low carbon economy; Carbon emission; Climate change

## 1. Introduction

Our planet is facing extraordinary threats due to climate change, which can be verified by observing a rise in the temperature of sea and air, increase in the average sea level worldwide and also in the melting of glaciers. This change is impacting the social and economic growth as well and has become one of the burning topics of discussion across the globe. Today, every nation and organization is talking about sustainable development to ensure environment conservation along with the development. The world has witnessed immense degradation in environment due to high growth of economic activity [1]. With the explosion of population and quest for high living standard, the focus around the world is on developing technology and achieving high economic growth. This pursuit of living standard has created havoc in the ecosystem, and effects are visible in the form of high pollutants in air, global warming, ozone layer depletion and unprecedented weather change. With the current pace the greenhouse gases are projected to double in the environment than preindustrial times [2]. The impact of this climate change is peculiarly alarming for the developing countries such as India, due to poor availability of resources and capabilities to tackle its consequences. In order to handle this problem the Indian Government (IG) favors multidimensional approach which puts different responsibilities to different stakeholders. For a developing country like India it is essential to strike a balance approach to ensure enhancement of economic activity and reduction in environmental degradation [3]. The environmental exploitation is prerequisite for the growth of economic activities, still the climate change demands care for the sustainable development of industries in India. India needs



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to ensure low level of energy consumption and reduced pollution to attract Foreign Direct Investments. This maintenance of low pollution and energy consumption by any country is termed as Low Carbon Economy (LCE) [4].

## 2. Low Carbon Economy (LCE)

The LCE was introduced in an article on energy which was published by a white paper of United Kingdom in the year 2003. LCE suggests sustainable development of economy by minimizing the ecological damage through the adoption of green practices. In 2005, at World Economic Forum the prime minister of United Kingdom proposes the LCE to the world. He favored the development of green technology to reduce carbon emission in the production, and emphasizes on recycling of waste material. He also proposed the establishment of a legal system to ensure LCE across the globe. The implementation of LCE requires joint efforts from political, public and scientific groups to ensure the long term sustainability of climate [5]. The inclusion of LCE is primarily to curb irresponsible activities which could potentially harm the ecological balance. Today, the most of the countries around the world are adopting different strategies to minimize the emission of carbon and are attempting for a transition of their economy to LCE. The policies and strategies to ensure LCE are being titled differently by different economies. These titles include green growth plans, low emission development strategies, climate change plans and many more [6].

### 2.1 Low Emissions Development Strategies

The nomenclature of “low-emissions development strategies” was done during the negotiations of climate change in the Framework Convention of United Nations. This convention aimed at a common purpose of minimizing the carbon emission and climate change. It also encouraged the developing countries like India to develop low carbon emission strategies for the sustainable development of their economies as a part of their national mitigation policy on environment. This strategy to minimize carbon emission has to act as the qualifying criteria for developing countries to look for financial support from international community [7]. The strategy must include the issues of climate change, low carbon emission and sustainable development. This strategy not only provides opportunity of international funding for developing countries, but also makes the country attractive for foreign investments. Although various countries are permitted to choose their own objectives and plans to ensure low carbon emission. These objectives should act as the road-map to the countries fulfill their vision, and move towards the green economic activities [8]. This would enable the countries to move towards sustainable development and LCE. Despite the fact that low carbon emission plan is different for the different countries due to their different priorities, but the vision and assessments of should be included in the plan of reducing carbon emission. Vision here refers to long term purpose which could lay the path for the policies, and assessments includes the projections of the different sectors to evaluate their role in carbon emission. Apart from vision and assessments, countries are also expected to specify their long and short term targets, along with the policies which could help them achieving these targets [9]. These targets should be sector-specific and should have specific plans of implementation. These implementation plans must reflect the details of funding, institutional capabilities and the criteria for their evaluation [10].

### 2.2 Challenges for LCE

#### 2.2.1 Commitment from Top Leadership

High level of political commitment is required to ensure that low carbon emission is among the top priorities of the government. Without political will any country could not move towards LCE. The legal regulations of any country set the direction for the organizations towards adopting environmental friendly practices. To achieve LCE governments could provide financial or tax benefits to organizations that are moving towards low emission of carbons. Governments need to ensure proper compliance of the regulations concerning environment by the corporations. Coordination and Cooperation between different ministries to ensure the effectiveness of developmental efforts [11]. The

same could be achieved by transforming existing mechanisms or introducing fresh mechanisms for comprehensive low carbon emission plan.

#### *2.2.2 Infrastructure related barriers*

The challenge of ensuring LCE could not be met by using existing technology. The solution lies in the radical transformation in technology and innovation. Such rapid innovation could only be facilitated by strong infrastructure and social processes. The increasing scarcity of fossils and high level of competition necessitates the need for innovation on the energy system. Literature has indicated a strong relation between high innovation, better technology and low carbon emission. In order to build a low carbon society, frequent innovation and its continuous adaptation is required. With rapid innovation another risk comes, i.e. the risk of failure due to technology [12]. The organizations face the risk of adoption of technology by the market, which would cost dearly to them. Another risk is the fear that new innovation would destroy their existing markets and products.

#### *2.2.3 High investment cost*

The challenge pertaining to cost can be viewed from the perspective of Governments as well as organizations. Governments often face the challenge of procuring and allocating funds for low carbon emission projects both domestically and internationally. In order to bag international funding, the goals and plans should be attractive, credible and achievable. The governments must provide framework for the allocations of investment in different fields to ensure to achieve LCE. On the other hand, high level of competition has pushed the organizations to adopt low cost practices. Since environmental friendly projects often involve high cost, it discourages the organizations to adopt environmental friendly practices.

#### *2.2.4 Manpower*

For the successful implementation of low carbon emission strategy, countries and organizations requires people with specific skills and knowledge. At macro level, governments could introduce education policies which reflect that importance of such knowledge and skills. The governments must include courses which could impart importance to low carbon emission and practices to achieve the same as the compulsory part of curriculum. At micro level, to ensure availability of manpower with such skills organizations could provide proper training to its' employees. Absence of competent manpower could sabotage the entire efforts of achieving LCE.

#### *2.2.5 Awareness Programs*

The vision of low carbon emission cannot be fulfilled without the support of public and organizations. Governments need to ensure that their citizens have the required knowledge and awareness about their role in making the nation a LCE. This would make citizens a stakeholder in achieving LCE. On the other hand, organizations should provide requisite training to its' employees on sustainable practices. Literature has suggested a pressing need to equip the manpower of small and medium scale industries with the skills and knowledge about energy efficient practices especially in developing countries.

### *2.3 Current Developments on LCE*

A new revolution on adopting green practices is required to achieve LCE. In order to sustain in the contemporary era, adaptation of LCE is a prerequisite. To curb the emission of carbon its trading is allowed as a part of international policy. The countries which could not fulfill their targets of low carbon emission could achieve the same using carbon trading. The problem of achieving low carbon economy is particularly high with the developing economies. Since economic prosperity and the consumption of energy are intertwined with each other. Hence, for one of the fastest developing economies like India large amount of energy consumption and subsequently carbon emission is inevitable. Therefore, countries like India must make attempt to become LCE. Prior studies suggest a strong association of electricity, industries, transportation, cities and technology with LCE [13]. Technology which could reduce or limit carbon emission is being promoted across the globe.

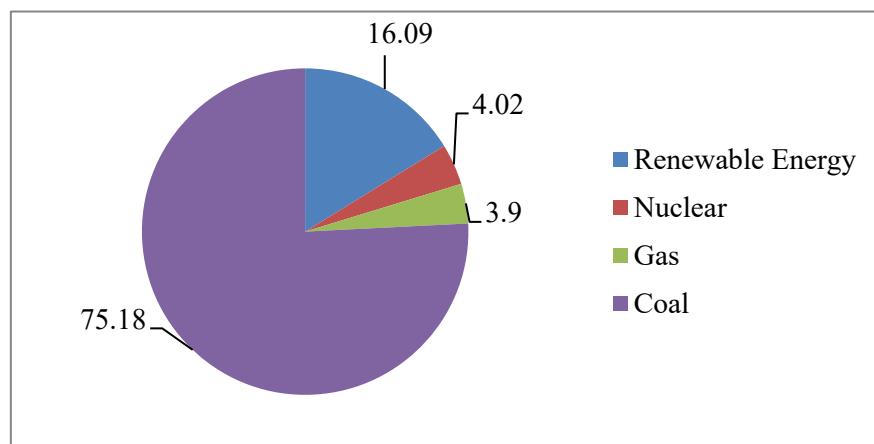
Organizations are encouraged to align their vision with LCE. Governments must reward such organizations who are contributing towards the vision of LCE. To achieve the same organizations needs to be responsive towards the carbon emission and adopt eco-friendly equipment and machines.

#### 2.4 Low carbon economy and the global economy

Climate change has demonstrated the devastation that we have caused to the world and ourselves. The fact that the energy resources cannot fill limitless demands. Therefore, a fundamental change in the functioning of the governments and organizations is required. Different countries have come up with different approaches in dealing with the climate change. LCE is the most prominent concept instrumental in bringing these changes. Organization for Economic Co-operation and Development (OECD) countries has set the target of reducing carbon dioxide density in the air to 450 ppm. France has pledged to reduce at least 60% of the carbon emission by 2050 with 1990 as base year. United Kingdom has also announced to reduce its carbon emission more than or equal to 70% by 2050 to build LCE. Germany has committed to make low carbon industries the leading industries for future development [14].

### 3. Building low carbon economy in India

According to NITI Aayog report, shift to low carbon economy in India will require additional investment of 1.5% of GDP over next decade till 2030. It also suggests that low carbon development in India would cost 834 USD till 2030 [15]. Alignment of Indian industrial development with the 2015 Paris agreement is crucial for India's transition to low carbon economy. Majority of India's energy requirement is presently fulfilled through coal and only 24.88% energy usage is supported by clean energy sources. Figure 1 below shows the percentage of various energy sources of India in the year 2020 [16].



**Figure 1** Energy sources of India, 2020 (Source: Ministry of Power, India <https://powermin.nic.in/>)

In recent years, India has taken number of Clean Development Mechanism (CDM) projects to promote the adoption and implementation of clean energy technologies [17]. It has also implemented Integrated Energy Policy (IEP) to balance between development and environment protection and achieve low carbon economy [18-19]. India has emerged as the global hub for development and utilization of renewable energy sources [20]. Since 2015 Paris agreement, emphasis has been placed on science-based targets to commit to sustainable practices [21]. Following are the some of the most significant initiatives and strategies India has taken to achieve low carbon growth trajectory.

#### 3.1 Multifaceted renewable energy program

India has been emerged as key player in the large scale commercialization of renewable energy technologies (RETs). It also become fourth largest in wind energy capacity and hydro power capacity

stands at 35000 MW which is expected to reach 50000 MW in 2025-26. It has also achieved 10000 MW renewable energy based capacity and added 2000 MW renewable energy every year.

### *3.2 Development of financing mechanism*

Various financing sources and mechanisms have been developed for low carbon development in India. This includes public finance, sustainable fund, green bond etc. Instrument like public finance has been used for greater allocation of funds for clean energy development projects in India. Reserve bank of India (RBI) also issued directives for promoting low carbon technologies in various environmentally sensitive industries [22-23].

### *3.3 Nuclear energy*

Considering India's enormous electricity demand, nuclear energy plays a key role in energy scenario to achieve low carbon economy. International Energy Agency (IEA) noted nuclear energy to be the cost-effective and environmentally sustainable source of power. A total of 7000 MW installed capacity has been achieved from twenty-two nuclear reactors and seven power nuclear plants in India till 2020.

### *3.4 Clean energy based public transport*

The government of India has given major push to CNG based public transport. National capital New Delhi has become the first major city in India to completely shift to clean energy based public transport. The government has also set up strict vehicle emission norms and implementing alternative freight transportation through waterways. Indian railways which is one of the largest rail network in the world is implementing innovative concept of RETs in railway operations. Indian railways aimed to become complete green mode of transportation and net zero emissions network by 2030. Emphasis has been placed on utilization of solar energy for traction power requirements in the railways.

### *3.5 Promoting Green Entrepreneurship*

Green entrepreneurship aims to promote eco innovation to develop low carbon economic system. It is business model that comprise of green technology, innovation, sustainability and development. New Ventures India which is a joint venture between Confederation of Indian Industry (CII) and World Resources Institute, US was established in 2005 promote sustainable enterprise by facilitating investment opportunities to green entrepreneurs in India. According to NITI report, green entrepreneurship will create 10 million jobs in the next decade. It will also help to achieve sustainable development goals in the country [24].

### *3.6 Carbon emission disclosure by corporate in India*

Carbon disclosure project (CDP) that encourages integration of clean energy and climate change strategies into the core business strategies. It was launched in India in the year 2007 to provide support to Indian industry in addressing climate change challenges and opportunities. It helps companies to report carbon emission. According to CDP report 2018, 6900 companies with the market capitalization of about 55 percent carbon emission and environmental data through CDP. India also became fifth country in the world to commit to SBT initiatives in line with the Paris agreement 2015 [25].

### *3.7 Promotion of CDM projects*

India also host largest number of CDM projects in the world. CDM national designated authority has approved more than that 747 CDM projects in India. These projects have led to 28 million tons of certified carbon emission reduction and directed investment in RETs through CDM funds. CDM portfolio in India comprises of mix of green field, energy efficiency and renewable energy projects. Steps have been taken to set up organized carbon market in India and trading of instruments such as Certified Emission Reduction (CERs), Voluntary Emission Reduction (VERs) and Verified Emission

Reduction. Efforts have been also taken to further link domestic carbon market with global carbon markets and facilitate participation of international financial institutions and stakeholders [26].

#### 4. Conclusion

Today, it has become imperative for every country to reduce carbon emission and strive for low carbon economy. Indian economy stands at the crossroads of achieving developments and at the same time address climate change issues. In this regard it has taken number of notable steps and has emerged as the pioneer to build low carbon economy. The paper outlines the imperative of building low carbon economy and India's current initiatives in the direction to reduce carbon emission in line with the Paris agreement 2015. Adherence to SBTs and development and implementation of RETs has grown rapidly in recent years. Similarly, the percentage of renewable energy sources has been consistently increasing which augurs well in the context of transition towards LCE. India is also host to the world largest clean energy programs. Greater emphasis has been placed on low carbon developments in environmentally sensitive industries. Overall, India is moving on encouraging trajectory of low carbon economy with well-designed domestic clean energy policy and consistent global engagements.

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