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India's Evolving Role in Addressing Climate Change Concerns

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India's Evolving Role in Addressing Climate Change Concerns

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Abstract

The concerns surrounding climate change have grown manifold in recent times. It has been observed that some developed countries have been shying away from playing their part in milestone agreements on climate change. The recent withdrawal of the United States from the Paris Agreement of 2015 and an abysmal performance post the formalization of the Kyoto Protocol of 2002 has shifted the onus of battling this catastrophic global issue on emerging economies, especially China and India. In this context, this paper provides a comprehensive overview of India's evolving role in addressing climate change concerns. From the Kyoto Protocol to the Paris Agreement, India has made positive and sincere strides towards the issue of global warming and climate change, embracing a number of policies and measures in its hope for a sustainable tomorrow. The article also highlights the environmental challenges faced by India in its economic development. Finally, it lists out the key recommendations that can be implemented by India for improving its environmental performance.

Keywords: Climate change; Global warming; Kyoto Protocol; Clean Development Mechanism; Paris Agreement; Carbon credits; Green Investments.

1. INTRODUCTION

Climate change is a global reality and one of the most difficult and important environmental challenges facing the international community (Wara, 2008). Higher temperatures, extreme weather conditions, and rising sea levels may critically harm productivity and output specially in developing countries.[1] Climate change also leads to increased natural calamities, such as floods and cyclones, declined crop yields, and ecological degradation. Hence, it has significant economic, social, and financial implications for economies around the world.[2]

Conventionally, developed countries have been majorly responsible for the emission of greenhouse gases in the atmosphere. However, it is projected that future carbon emissions could significantly come from emerging and developing countries that are on their path to economic progress.[3] According to the researchers at the University of East Anglia and Global Carbon Project,[4] India contributed 6.3% of all global CO_2 emissions in 2015, following a period of strong growth. China, the biggest CO_2 emitter, stood at 29%, followed by the United States at 15% and European Union at 10% in the year 2015. India, home to more than

1 https://www.imf.org/external/pubs/ft/fandd/2008/03/pdf/cline.pdf
2 http://envfor.nic.in/sites/default/files/pressreleases/revised%20PPT%20Press%20Conference%20INDC%20v5.pdf
3 http://www.livemint.com/Politics/JaP9Li2yON97RspOD0oAgN/Budget-201617-Rs2000-crore-for-providing-cooking-gas-to-t.html; https://www.iea.org/weo2017/
4 http://www.thehindubusinessline.com/news/science/indias-carbon-emission-increased-by-over-5-in-2015/article9343991.ece

a billion people and an emerging economic powerhouse, belongs to the top fourth largest CO_2 emitters, although its per capita emissions are still relatively low.[5]

In recent times, we have witnessed considerable volatility in the commitment of countries toward addressing the issue of climate change. The withdrawal of the United States from the Paris Accord is a major downturn in the collaborative global efforts for climate change. Climate experts consider that the US withdrawal from the Paris Agreement creates an opportunity for China to emerge as the global leader on climate change (Hilton and Kerr, 2017). It is increasingly being recognized that the efforts to combat climate change will have to be integrated into the Economic Development model of countries by including sustainable development, to be effective. There is a need to integrate climate and broader environmental issues into our social and economic systems. Increasing evidence also suggests that transitioning to a green economy from a brown economy has sound economic and social validation.

This paper examines the evolving role of India, one of the fast-growing emerging economies, in addressing the issues of climate change. We assess India's efforts at various international climate agreements as well as the measures carried out domestically to combat climate change. Thereafter, we identify the challenges that have impeded India's environmental performance and suggest ways to overcome these challenges so that India's efforts in addressing climate change concerns could become more effective.

2. INDIA'S ROLE IN GLOBAL PLATFORMS ON CLIMATE CHANGE

2.1. Kyoto Protocol and India

The global carbon story started in Kyoto, where the first international agreement for greenhouse gas (GHG) reduction was signed. Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC), which sets internationally binding emission reduction targets for the parties. It was adopted in 1997, and it entered into force in 2005. Kyoto Protocol has set defined targets on the developed countries to reduce GHG emissions under the principle of "common but differentiated responsibilities," as developed countries are the principal contributors to GHG emissions in the atmosphere. The Protocol placed no immediate targets for the developing countries. The developed nations agreed to reduce 5.2% of GHG emissions from the 1990 level by 2012.[6] As developing countries had no GHG reduction targets, they have to finance and encourage projects to reduce GHG emissions in their countries and receive carbon credits for their endeavors that can then be sold to companies and organizations in developed countries.

The Kyoto Protocol introduced three flexible mechanisms: Emission Trading Schemes (ETSs), Joint Implementation (JI),[7] and Clean Development Mechanism (CDM) to allow developed countries to meet their GHG emission targets.

1. *Emission Trading Schemes*: ETSs also known as cap and trade system are intended as a government-to-government market where states can buy or sell credits known as Assigned Amount Units (AAUs) as part of their cap.
2. *Joint Implementation*: JI mechanism allowed developed countries to invest in GHG reduction/removal projects in other developed countries. The credits awarded to projects are known as Emission Reduction Units (ERUs).
3. *Clean Development Mechanism*: CDM allowed developed countries to invest in climate friendly projects in the developing countries. Tradable credits known as Certified Emission Reductions (CERs) are awarded to projects to reduce GHG.

Kyoto Protocol under the market-based structure of CDM contributed to sustainable development and emission reductions in the developing countries. Many national and subnational governments turned to carbon markets to meet their future GHG emission goals; however, the demand trend was seen more toward selling than buying of carbon credits.

5 https://www.carbonbrief.org/guest-post-why-indias-co2-emissions-grew-strongly-in-2017
6 http://unfccc.int/kyoto_protocol/items/2830.php
7 Joint Implementation mechanism was mostly confined to projects in Russia, Ukraine, Poland and Germany.

CDM introduced by the Kyoto Protocol is a project-based flexible mechanism aimed at reducing the costs of abatement of GHG emissions. This mechanism was established to facilitate achievement of twin objectives by fulfilling developed countries commitment toward Kyoto emission targets and stimulating emission reduction projects in developing countries. As the ratification of the Kyoto Protocol in 1997, eligible institutions and projects globally have been enjoying income inflows from the carbon economy. CDM allowed Annex B countries to implement emission reduction projects in developing countries and earn CER credits. Each CER credit is equivalent to a ton of $CO_{2.}$

2.1.1. Working of CDM in India

India has always been a major participant in the global climate change debate. It has been playing an increasingly constructive role in international climate change negotiations. India agreed to the provisions of Kyoto Protocol in August 2002, and one of the goals of acceding was to fulfill the prerequisites for implementation of CDM projects in accordance with the national sustainable priorities. India became an active participant in the CDM second after China.

Indian companies have registered their green projects with the UNFCCC to earn carbon credits. The largest project categories are biomass and wind power. Mostly, projects undertaken in India are on a unilateral basis, developed independently by local stakeholders without the direct involvement of Annex 1 countries. Carbon credits create market for reducing greenhouse gases emission by giving a monetary value to the cost of polluting the air. This means that carbon becomes a cost in business, and it can be seen like other inputs such as raw materials or labor.

There are many actors involved in creating a carbon-offset project. There is a verification body that validates how many tons of CO_2 a project saves, then the registration body that operates the registry where a buyer can search for the projects, and lastly the company that ultimately buys the credits. The company selling carbon credits must calculate its carbon savings against a very specific methodology and get an official body to validate the project.

Carbon credit trading gave Indian companies an efficient mechanism to generate sustained revenue by selling carbon credits generated through their green operations (Chotalia, 2013). The author analyzed the data by comparing the various companies' issued CERs and its effect on Internal Rate of Return (IRR). The results confirmed that that there is some significant positive effect of carbon credit on company's IRR. For the emitting company, carbon credit trading facilitated them to compensate for the GHG emission generated by their businesses.

There are many other Indian companies that have earned substantial amount of money by selling carbon credits through the CDM. Indian companies such as Gujarat Flourochemicals Limited, Rana Sugars, Jai Prakash Power Venture Limited, SAIL, ONGC, DMRC, Reliance Industries, Grasim Industries, ITC, Gujarat Ambuja Cements Ltd, Jindal Thermal Power Company Ltd, and Torrent Power hold carbon credits (Bhanawat and Vardia, 2015; Rajput and Chopra, 2014; Mondal and Sachdev, 2013).

Indian companies have generated cash inflows by selling CERs to companies in developed countries especially in Europe through carbon exchanges or bilateral deals. Gujarat Flourochemicals Limited, Rana Sugars, and Jai Prakash Power Venture Limited have earned more than 1% of total revenue from selling carbon credits (Bhanawat and Vardia, 2015). Another study by Rajput and Chopra (2014) listed Gujarat Ambuja Cements Ltd, Jindal Thermal Power Company Ltd., and Torrent power Ltd. as the major beneficiaries of the ETS.

The list of Indian companies who have registered with the CDM for various projects has been provided in Table 1.

Although carbon credit trading has offered many opportunities to India Inc., its full potential has not been realized (Canta Moniz, 2013). India, the second largest host of CDM, seeks to leverage the benefits derived from the CDM but lacks in establishing strategies and policies in the Indian carbon market. Administrative hurdles posed by UNFCCC, cultural issues faced by investors willing to invest in Indian market, lack of action for real technology transfer and foreign investment, and private sector-oriented Indian carbon market are the various challenges for the Indian carbon market.

2.2. Paris Agreement and India

The Paris Agreement of 2015 had been a landmark year for international climate change negotiations though the agreement will come into force no later than 2020. Governments around the globe have agreed to adopt

Table 1. Indian Companies Registered with CDM.

S. No.	Company name	Registered projects
1	Tata Steel	Waste heat recovery-based power project
2	Kesoram Industries	Steam system upgradation
3	Jaya Shree Textiles	Energy efficiency
4	ACC	Blended cement
5	Birla Corp	Blended cement
6	JK Cement	Waste heat recovery-based power project
7	JCT	Small scale biomass
8	RIL	Energy efficiency
9	USWL	Cogeneration
10	Shree Cement	Optimal utilization of clinker
11	TNPL	Methane extraction, fuel conservation
12	Rana Sugars	Bagasse-based cogeneration
13	Ultra Tech Cement	Production of Pozzolana cement
14	United Phosphorous	Natural gas as fuel
15	Nahar Spinning	Rice husk-based cogeneration

Source: http://fincirc.wordpress.com/2013/03/13/a-study-on-accounting-aspects-of-carbon-credits/

a universal legal agreement on climate change aimed at low-carbon sustainable future at the 21st Conference of Parties (COP21) to the UNFCCC. Each country submitted their Intended Nationally Defined Contributions (INDCs) for GHG reduction based on their respective national circumstances. The process of regular review and submission is binding although the emission reduction targets are not legally binding.

The Paris Agreement requires all countries to submit updates every five years on their INDCs on actions to address climate change and their successive INDCs should reflect the highest level of mitigation efforts. Developed countries should take climate leadership and set ambitious emission reduction targets.

The Paris Agreement is however different from Kyoto Protocol in two ways. Firstly, it does not call for legally binding emission reduction targets. It is based on voluntary commitments to climate change actions by each country. Secondly, Kyoto Protocol had obligated responsibility only on developed countries for GHG reduction targets; Paris Agreement places requirements on developed as well as developing countries for GHG reduction.

India has strongly committed itself to fight climate change by submitting its INDCs to reduce emissions at the Paris Agreement of UNFCCC in December 2015. The Indian Government has committed to the goal of receiving 40% of its power from renewable resources by 2030 and to reduce the emission intensity of GDP by 33–35% by 2030.[8] India submitted its INDCs on October 1, 2015, prior to COP15; the following box (Box 1) presents the highlights of India's INDC.

3. NATIONAL MEASURES TO COMBAT CLIMATE CHANGE

3.1. Investments in Clean Energy

India has the world's largest expansion plan in the renewable energy by setting up an ambitious target of 175 GW of renewable power by 2022.[9] This will include energy generation from renewable sources such

8 http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/indiacphaccord_app2.pdf
9 https://www.investindia.gov.in/sector/renewable-energy

Box 1. Highlights of India's INDC*.

Fuel Mix:

- Share of nonfossil resources in installed power capacity to 40% by 2030
- Increase nuclear capacity from its current 5.8 GW to 63 GW by 2032
- Increase the share of renewable (wind, solar, bioenergy) installed power capacity cumulatively from 30 GW currently to 175 GW by 2022
- Upgrade the efficiency of 144 thermal coal plants, with the launch of the 13th Five Year Plan requiring that all new coal plants employ supercritical technology

Infrastructure:

- Under the National Smart Grid Mission: invest $6 billion in Green Energy Corridor projects to evacuate power generated by renewable energy sources
- Increase the share of railways in total land transportation from 36% to 45%
- Create two DFCs that over 30 years will reduce CO_2 emissions by 57 million tons
- Under the Smart Cities Mission and Atal Mission for Rejuvenation and Urban Transformation projects target infrastructural improvements in 600 cities

Efficiency:

- Under the National Mission for Enhanced Energy Efficiency (NMEEE) obviate the need for 20 GW of capacity additions, corresponding to 23 million tons of CO_2
- Under the forthcoming Vehicle Fuel Efficiency Program to be implemented starting April 2016 save 50 million tons of avoided CO_2 emissions

Finance:

- Implement a carbon tax on coal of INR 200 ($3.20) per ton to contribute to the National Clean Environment Fund
- National Adaptation Fund setup with initial allocation of INR 3500 million ($55.6 million)
- Subsidies to be disbursed through direct cash transfers

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=128403

as Solar, wind, biomass, and hydropower. India has increased its investments in clean energy to fulfill its climate pledges. According to a report by Bloomberg New Energy Finance (2018),[10] investments into clean energy have risen substantially during the years surpassing China. Figure 1 shows the investments in clean energy by India from 2007 to 2017.

3.2. Carbon Tax

India is among the few countries in the world to have introduced carbon taxes. Carbon taxes are an effective tool to reduce GHG emissions to fight climate change. A carbon tax is a tax on the carbon content of fossil fuels such as oil, coal, and natural gas that produces CO_2 emissions when used. According to sources, for a country like India, a combination of carbon taxes and removal of fossil fuel subsidies could provide more than 95% of the public financing for development goals.[11] The government of India has levied an implicit carbon tax of USD 140 for petrol and USD 64 for diesel in absolute terms.[12]

3.3. Clean Environment Cess

Clean Environment Cess is a kind of carbon tax, and it is levied on coal and its variants. India is highly dependent on coal for meeting its high-energy needs. Clean Environment Cess was introduced in 2010. The government of India has substantially increased the coal cess from INR 50 per ton to INR 100 per ton in 2014 to INR 200 (USD 3.2) in 2015 per ton of coal and further to INR 400 in the Union budget 2016–2017.[13]

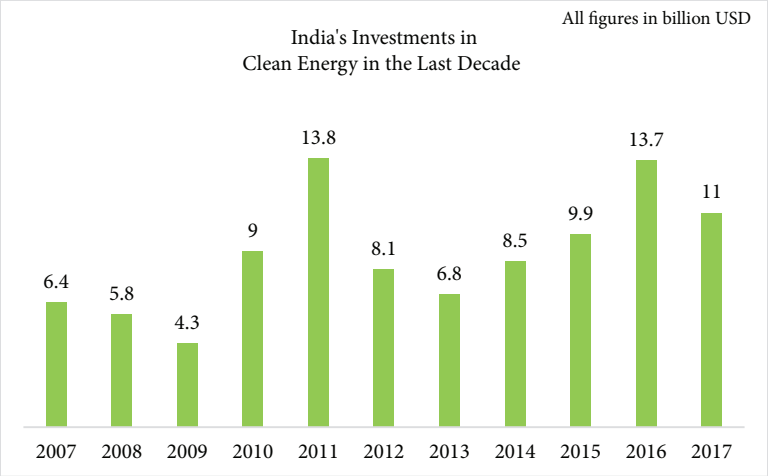
10 https://qz.com/1323902/indias-investments-in-renewable-energy-are-growing-faster-than-even-chinas/

11 http://www.anthropocenemagazine.org/2018/07/how-a-carbon-tax-could-fight-poverty-and-climate-change-at-the-same-time/

12 https://www.indiabudget.gov.in/budget2015-2016/es2014-15/echapvol1-09.pdf

13 http://www.livemint.com/Politics/JaP9Li2yON97RspOD0oAgN/Budget-201617-Rs2000-crore-for-providing-cooking-gas-to-t.html

Figure 1. India's Investment in Clean Energy.



Source: Bloomberg New Energy Finance, 2018.

India in its INDCs to the global community has committed to add 175 GW of renewable-generation capacity by 2022, including 100 GW from solar and other renewable sources as well. Moreover, the revenue from carbon taxes will be invested in doubling the share of renewable energy in the total energy mix.[14]

3.4. Perform, Achieve, and Trade

Perform, Achieve, and Trade (PAT) is an innovative, market-based trading scheme to improve energy efficiency in industries by trading in energy efficiency certificates among specific energy-intensive industries in India. PAT is a program administered by the Bureau of Energy Efficiency to promote enhanced energy efficiency and reduce energy consumption in energy-intensive industries.[15]

3.5. Push for Electric Vehicles

Mobility plays an imperative role in the growth and development of an economy. But the transport sector also contributes to global CO_2 emissions. India, the largest automobile manufacturers in the world, has decided to have 30% vehicles as electric vehicles by 2030.[16] The National Electric Mobility Mission Plan by India launched in 2013 was designed to achieve national fuel security by providing impetus to hybrid and electric vehicles in the country.[17] Electric vehicles emit less GHG emissions than the traditional petrol and diesel engine cars, thus mitigating climate change and GHG from road transport.

3.6. International Solar Alliance

India has done a commendable task by bringing International Solar Alliance (ISA) to the international community by facilitating access to sustainable energy. ISA, an alliance of 121 solar resource rich countries, was first initiated by Prime Minister Narendra Modi at the India–Africa Meet.[18] The alliance will bring together sunshine countries to promote solar energy and share innovative solar development technology. India has always played a significant role in promotion of solar energy, and it has a target to produce 100 GW of energy from solar by 2022.

14 http://www.arthapedia.in/index.php?title=Clean_Energy_Cess_-_Carbon_Tax_of_India
15 http://iepd.iipnetwork.org/policy/perform-achieve-trade-scheme-pat-scheme
16 https://www.financialexpress.com/auto/car-news/government-finally-wakes-up-sets-a-realistic-goal-of-30-electric-vehicles-by-2030-from-existing-100-target/1091075/
17 http://pib.nic.in/newsite/PrintRelease.aspx?relid=116719
18 https://www.newdelhitimes.com/indias-prominent-role-in-international-solar-alliance/

4. INDIA'S ENVIRONMENTAL PERFORMANCE: KEY CHALLENGES

While a number of steps are being taken by the government to achieve its goals of environmental protection and sustainability, India is among the bottom five countries on the Environmental Performance Index 2018, plunging 36 points from 141 in 2016 to 177 in 2017, according to a biennial report by Yale and Columbia Universities in collaboration with the World Economic Forum.[19] In spite of being a global leader in renewable energy and having multitude of environmental laws to protect the environment, there are various reasons for the dismal environmental performance of India, which have been pointed below:

1. India's rapid economic growth has brought many benefits in terms of employment opportunities and eradication of poverty, but at a price tag for the environment. India's efforts to increase its GDP through massive industrialization resulted in environmental degradation, depletion of natural resources, and rising air and water pollution.
2. India relies on coal for around 60% of its total electricity generation.[20] Although consumption of coal causes enormous CO_2 emissions, India uses coal as an alternative to other fuels as its coal reserves are abundant and is a cheap source of energy.
3. The major environmental laws in India such as The Water Prevention Act (1974), The Air Protection Act (1981), and the Environmental Protection Act (1986) date back many years and are outdated. While there is fundamental and dynamic environmental policy updates in developed as well as developing countries such as China, India takes no notice of the emergence of newer pollutants and their impact on human health. Environmental outlook in India is still vague in many aspects of environmental decision making.
4. Although India was one of the first countries globally to enact a special Corporate Social Responsibility Act 2013 that mandated large and midsized companies to contribute 2% of their profits to social and welfare projects, it presented many problems such as false disclosures and Greenwashing by companies. Greenwashing is adopted by companies to look more environmental friendly due to legislation rather than in spirit.
5. India is the second populous country in the world, and if the population growth remains strong, India is all set to overtake China as the world's most populous country by 2025.[21] Rising population puts demand on existing energy needs and consumption.

5. RECOMMENDATIONS FOR IMPROVING ENVIRONMENTAL PERFORMANCE

While the INDCs submitted by India is ambitious with respect to increase the share of nonfossil-based power generation, there are various other key aspects to be considered for climate change policy making. The following key recommendations can be considered for achieving the INDC's targets.

5.1. Green Investing

A path toward low carbon and climate resilient development necessitates consistent finance flows. The US withdrawal from the Paris Agreement is a big setback for developing countries in two key aspects: finance flows and technology transfer. A transition to low carbon economy from high carbon dependency requires switching to eco-friendly fuels, sophisticated technology access, and investments in clean energy. Without access to substantial resources, low carbon development in developing countries would be difficult and rather impossible to get desired results.

India with its low per capita emissions, high poverty rates, and limited access to funds integrating economic development with sustainable development require regular financing flows. Financing is the most

19 http://www.thehindu.com/sci-tech/energy-and-environment/india-ranks-177-out-of-180-in-environmental-performance-index/article22513016.ece

20 https://www.iea.org/publications/freepublications/publication/IndiaEnergyOutlook_WEO2015.pdf

21 https://timesofindia.indiatimes.com/india/indias-population-to-surpass-that-of-chinas-around-2024-un/articleshow/59257045.cms

important issue influencing how quickly developing countries will move on implementing their INDCs, particularly the conditional pledges that most of them contain (Clemencon, 2016). Over the next six years, India needs more than $140 billion in financing to reach its solar, wind, and efficiency targets.[22]

Even greater financing of $834 billion USD is required to achieve India's 2030 Paris targets.[23] Henceforth, Green Investing should be given a priority in countries like India due to the following reasons:

(a) Global Climate leaders advocated that securing financing for adaptation and mitigation efforts are the answer to any attempts to fight against climate change.
(b) Transfer of clean energy technologies by innovating countries has been restricted through their protectionist policies and trade laws. So a developing country like India needs substantial funds to research and develop advanced clean energy technologies.
(c) Adoption of sophisticated clean technology by companies demands financial and technological flows. CDM-linked flows, which have helped in financing clean technologies and sustainable development over the past many years, have dried up since 2012 due to the oversupply of CER certificates, which are now trading at near-zero levels.[24]
(d) The government of India is targeting a further 175 GW of additional renewable energy capacity across the country by 2022.[25] Therefore, there is a considerable requirement for innovative financing instruments to help achieve this challenging target set by the Indian Government.
(e) Financing low-carbon development is a decisive challenge for the Indian economy. This challenge has become more difficult due to the global macroeconomic imbalances. Investments in sustainability could face obstacles due to the macroeconomic and banking regulations such as Basel regulations (Kedia and Jain, 2015).[26] Funds via Green Investing can fill this financing gap for investments in low carbon development.
(f) The fossil fuel divestment campaign around the world is sending important signals to the investor's community that fossil fuels are a losing asset class and a number of institutional investors are moving away from fossil fuels investments.[27]

5.2. Indian Emission Trading System

Climate change mitigation policy has evolved rapidly both internationally and domestically since the introduction of Kyoto Protocol flexible mechanisms. ETS is a market-based mechanism, also known as a cap and trade system, that aims to place an overall cap on CO_2 emissions. Under this mechanism, parties responsible for CO_2 emissions will be allocated permits (allowances) to emit a specific amount of CO_2 within the cap. For each allowance received, they can emit one ton of CO_2. If the parties to ETS exceed their allowances beyond the limit allocated, they must purchase allowances from parties who have unused permits. The price of emissions allowances is determined by the free market. The company polluting less will profit from this transaction. The EU emission trading scheme (EU-ETS) is the brainchild and one of the mechanisms for GHG reduction mechanism for Kyoto Protocol. EU-ETS is the world's first and largest international emissions trading scheme in the world. Launched in 2005, it accounted for over three quarters of international carbon trading.[28]

Investments in renewable energies majorly depend on the price of carbon. For India to enable a global energy transition, carbon prices should be capped and carbon-pricing schemes should be implemented to facilitate a shift from carbon-intensive fuels to clean fuels. While there is no established Indian carbon market or carbon pricing policy, PAT and Renewable Energy Credit (REC) trading system are the two market-based mechanisms for emission reductions.

22 http://niti.gov.in/writereaddata/files/writereaddata/files/document_publication/report-175-GW-RE.pdf
23 https://www.nrdc.org/sites/default/files/paris-climate-conference-India-IB.pdf
24 http://climateobserver.org/cop21-and-the-clean-development-mechanism-deciding-the-future-of-international-carbon-credits/
25 http://niti.gov.in/writereaddata/files/writereaddata/files/document_publication/report-175-GW-RE.pdf
26 http://www.teriin.org/projects/locci/pdf/res/Policy_Brief_LCD_Finance.pdf
27 https://gofossilfree.org/divestment/what-is-fossil-fuel-divestment/
28 https://ec.europa.eu/clima/policies/ets_en

PAT resembles an ETS, the only difference is that traditional cap and trade specifies an absolute cap and PAT specifies energy targets that are based on intensity. Although India has mandated the implementation of pilot ETSs in three states, namely Maharashtra, Tamil Nadu, and Gujarat, there is no uniform Indian ETS that can be used to reduce emissions of particulates. The Paris Agreement makes a provision for Internationally Transferred Mitigation outcomes.[29] India can leverage this provision by translating into a new market-based mechanism for carbon trading or integrate it with existing market-based mechanisms.

5.3. Green FDI

The past three decades have witnessed a tremendous change in the Indian economic policy following a transition from a closed economy to an open economy. MNCs increased their production, leading to increased private investment flows, by reducing trade barriers. As FDI contributes to economic development at a large scale, Environmental regulatory standards by host countries take a backseat resulting in inefficient and irreversible environmental destruction (Mabey and McNally, 1999)[30] Empirical evidences confirmed that FDI significantly increases the carbon emissions of the host country, which supports the pollution haven hypothesis (Javorcik and Wei, 2001; Kentor and Grimes, 2006; Hoffmann et al., 2005; Jorgenson, 2007, Acharyya, 2009; Murthy and Bhasin, 2016).

The particular implications of FDI on the environment have given rise to a concept called "Green FDI." Green FDI refers to FDI in sectors where the scope for environmental spillovers in terms of energy efficiency and pollution reduction and control is greatest. Green FDI can be used for transfer of technology to developing countries, as FDI has the potential to transfer environmentally friendly industries, practices, and technology that contribute to environmental progress. As the technical know-how for controlling emissions rests with companies in developed countries, FDI can facilitate dissemination of knowledge-based assets (Popp, 2009). As India decides on its climate change tackling strategies, the detrimental impact of FDI on the country's environment should be considered. Measures should be taken to promote Green FDI inflows into the economy.

5.4. Bilateral Climate Partnerships

India's climate mitigation action was contingent on receiving financial and technological support from developed countries, as the Kyoto Protocol required developed countries to take the responsibility of deep mitigation and providing financial support to developing countries. Looking at the past dismal figures of financial and technological support from developed countries, Paris Agreement offers no incentive and is a loss for India. Therefore, the Indian government should increase their bilateral effort in the collective international climate efforts.

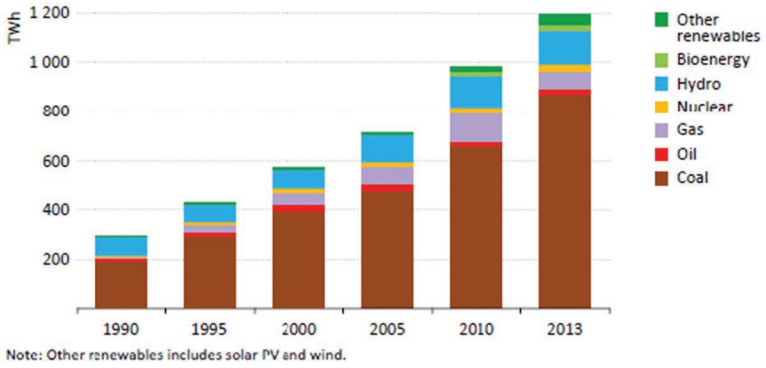
India has engaged in bilateral partnerships with France and the United States. India and France in a bilateral climate partnership launched the ISA for promoting solar power, both generation and storage of solar energy. The alliance aims to mobilize $100 Billion USD by 2030 for solar power generation. The Clean Energy Finance Initiative between India and the United States will mobilize $400 million for providing clean and renewable electricity for up to one million households by 2020. As India works to fulfill its climate pledges, it needs more Bilateral Climate Partnerships with developed countries for access to eco-innovative technology.

5.5. Stringent Environmental Laws

Usually, developing countries are characterized by highly pollution-intensive conditions, weak environmental regulatory frameworks and enforcement mechanisms, limited institutional capacity, inadequate information on emissions, and zero cost on pollution.[31] However, recent studies have indicated that many developing countries are now addressing environment and sustainability concerns by adopting stricter environmental standards and engaging in sustainable business practices (Bhasin, Murthy, and Jain, 2016; Stern, 2004). While India has also received its own share of environmental laws, there is more that needs to be done in respect of effective implementation of these laws. Frequently, lobbying by powerful political

29 http://blogs.worldbank.org/developmenttalk/international-transfers-mitigation-achieve-goals-paris-agreement
30 http://www.oecd.org/investment/mne/2089912.pdf
31 http://www.oecd.org/investment/mne/2089912.pdf

Figure 2. Share of Fuels in Electricity Generation in India.



Source: India Energy Outlook, 2015.

and corporate groups acts as a major deterrent toward effective implementation of environmental rules and regulation. The government would do well to bring in greater institutional reforms, increase the accountability of firms in respect of environmental performance, and ensure strict enforcement of these laws at all levels of governance.

5.6. Private Sector Participation

Indian Private Sector has taken several measures to fight climate change and have integrated sustainability into their value chain. There are many Indian companies who have voluntarily adopted international reporting standards such as Global Reporting Initiative. Aditya Birla Group, Ambuja Cement, GAIL (India) Limited, ITC, Jindal Stainless, JSW Group, Jubilant Life Sciences, Mahindra & Mahindra Limited, Power Grid Corporation India Limited, Reliance Industries Limited, State Bank of India and Tata Consultancy Services are the major Indian names that have adopted Global Reporting Initiative (GRI) guidelines.[32] Traditionally, businesses viewed climate change efforts as an additional cost to the business; however, in today's scenario, there is enough motivation and incentives for Indian corporate sector to lead the charge in adopting environmentally friendly practices. This attitude of the private sector toward fighting climate change can be leveraged by the government to implement projects involving public–private partnerships. Such partnerships would make the fight toward climate change issues more broad and would also generate greater funds for developing cleaner technologies.

5.7. Installed Renewable Capacity

The Paris Agreement focuses on capacity building in developing countries. Although the government of India has one of the largest renewable capacity expansion programs in the world, which will lead to good policy making and performance for the country, Coal still remains the vital fossil fuel for meeting India's energy needs. Figure 2 shows the total electricity generation in India through different sources of fuel.

5.8. Green Individual Behavior

According to a report released by consulting firm The Boston Consulting Group, India will become the third largest consumer economy by 2025.[33] As the Indian consumer market continues to grow and evolve, more and more Indian consumers should embrace Green Individual Behavior. Green Individual Behavior can be used as synonyms for conscious consumerism or ethical consumerism.

Green Individual Behavior refers to consumer behavior in favor of eco-friendly goods and services or association with sustainable companies. Consumers should select brands, stores, and products in such a way to reduce their individual's environmental impact. As there is a famous quote—Every step counts, if

32 https://www.globalreporting.org/information/news-and-press-center/Pages/Leading-Indian-companies-join-GRI's-reporting-network.aspx

33 https://www.bcg.com/d/press/21march2017-new-indian-changing-consumer-149010

most Indian consumers exhibit green behavior and channelize their purchasing power toward sustainable companies, it could lead to greater positive impact on the environment.

6. CONCLUSION

There is no doubt that achieving low-carbon and climate resilient growth requires substantial commitment of funds. But if this green transition is successful, India will be at a better position to manage its energy security needs and make its business model more sustainable and carbon-free. India had demonstrated a strong stance toward climate change in the past despite many challenges at home and at present in the form of its INDCs for effective co-operation through its climate pledge at the Paris Accord.

India also strives to achieve efficiency through investments in Green appliances, Green buildings, and sustainable transportation. Propelling renewable sector with support of corporate sector participation, green funds at disposal, and access to eco-innovation from co-operative partnerships, India will be able to achieve its INDCs well before on time.

While India has been progressively working toward combating climate change concerns, its efforts have been impeded by challenges in the form of massive industrialization, dependence on coal as a source of energy, and lax implementation of environmental laws. With its continued commitment to engaging in sustainable and environment-friendly development, India can significantly improve its environmental performance if it implements measures such as green investment, bilateral climate partnerships, greater use of renewable energy sources, stricter implementation of environmental standards, and greater private sector participation in sustainable development.

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