CHAPTER 19

SUSTAINABILITY AND CLIMATE CHANGE: INDIA AND THE WORLD

*"... this is the only home we have and, as environmentalists are fond of saying, Mother Nature doesn't do bailouts ... so we better find a better way to grow."**

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*Thomas L. Friedman, ***Hot, Flat, & Crowded****, (London: Penguin Books, 2009), p. 23.*

INTRODUCTION

Improving living standards for mankind has been the single minded goal of all nations and world bodies. After defining development in numerous ways for over two decades, there seems to be a consensus on 'Human Development'. While a large population on the earth is still to get the 'bare minimum' for development, humanity is at the crossroads where it is faced with the first of its kind challenge—the challenge of 'climate change'. The dilemma is that whatever we can do for our development, there has to be a repercussion on nature. An even bigger dilemma is in achieving a global consensus on how to check or restrict and finally reverse the process of climate change.

We may consider the year 2012, arguably, a high water mark in the field of environment and sustainable development initiatives. The global community met at the *UN Conference on Sustainable Development* that took place in **Rio** in June 2012, also marking the 20th anniversary of the first Earth Summit held in 1992. The conference reviewed the progress made, identified implementation gaps, and assessed new and emerging challenges, which resulted in a political outcome called the *'The Future We Want'*. In India, the Twelfth Five Year Plan was launched with a focus on sustainable growth. This along with sustainable development policies and programmes, which are being followed signalled to citizens at home and the world at large that India is committed to sustainable development with equal emphasis on its three dimensions—social, economic and environmental.

A survey of the global comparative opinion shows that people in India and indeed all countries, have a marked and rising concern about sustainable development and climate change *(*cited by the *Economic Survey 2014–15)*. However, the challenges are also formidable, especially in the context of finding the matching resources of the required magnitude given the economic conditions. Climate science has rightly taken up an important position in the public debate. Even as the science of climate change grapples with uncertainties, the world is witnessing more extreme events. With rising extreme events, and rising citizen demand, the world has little option but to listen to the voice of evolving science and respond adequately with strategies and policies rooted in the principles of multilateralism with equitable and fair burden sharing.[1]

Since 2010 onwards, the world has witnessed increasing numbers of natural disasters and extreme weather conditions—frequently getting news headlines across the world. Policy-makers have been facing enormous pressure on availability of clean air, water and energy together with the problems of poverty and hunger, especially in the developing world. Though, the concerns of climate and environment have been there in India's policies, we see it increasing in the past half a decade. It was in *Economic Survey 2011–12* that a chapter 'Climate Change and Sustainable Development' appeared—the chapter has been retained by the upcoming volumes. This shows the inclusion of environmental concerns in India's policy-making.

The ***year 2015*** witnessed two landmark international events—the historic climate change agreement under the *UNFCCC in Paris* in December 2015 and the adoption of the *SDGs* (Sustainable Development Goals) in September 2015. The Paris Agreement aims at keeping the rise in global temperatures well below 2°C,which will set the world towards a low carbon, resilient and sustainable future, while the Sustainable Development Goals, which replace the MDGs (Millennium Development Goals), set the development agenda for the next fifteen years. On the domestic front too some important climate-related initiatives were taken, including

1. Oliver Morton 'Megachange: The World in 2050', in Daniel Franklin and John Andrews, ***The Economist*** in London: 2012) pp. 92–110.

the launching of the historic *International Solar Alliance* (an initiative taken by India) and the submission of the ambitious INDC (Intended Nationally Determined Contribution).

GLOBAL EMISSIONS

As per the WMO (World Meteorological Organization), 2016 was the *warmest* year, with temperature 1°C above the pre-industrial era. This was owing to *El Nino* and warming caused by greenhouse gases (GHGs). Anthropogenic emissions have been increasing at an unprecedented rate since the industrial revolution. According to an IEA (International Energy Agency) report 2015, concentration of CO_2 in 2014 was 40 per cent higher than in the mid-1800s. The energy sector is the largest contributor to GHG emissions and, within this, CO_2 emissions from combustion of fuels have the largest share. The global emissions profile[2] shows that emissions have been distributed very unequally among different countries:

(i) If historical CO_2 emissions from 1970 to 2014 are considered, India with 39.0 Gt is way behind the top three emitters—the USA (232 Gt), the EU (190.2 Gt) and China (176.2 Gt). USA's emissions, for example, were around six times India's.

(ii) Even if historical levels are discounted and only present levels considered, both in terms of absolute and per capita emissions, India is way behind the three major CO_2 emitters. Per capita emissions for USA, EU, China and India are—17 ton/capita, 7.5 ton/capita, 7 ton/capita and 2 ton/capita, respectively.

(iii) In terms of sectoral CO_2 emissions from fuel combustion, electricity and heat production was the largest contributor for China, India, the EU and the USA, more so for China and India, followed by the manufacturing industry for India and China and the transport sector for the US and the EU. These compositional patterns reflect the different priorities of these countries.

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

The UN General Assembly in its 17th session in September 2015 announced a set of *17 SDGs* (Sustainable Development Goals) and 169 targets which will stimulate action over the next 15 years. This set of goals replaces the Millennium Development Goals (MDGs) which were coming to an end in 2015 and will try to work in the areas which could not be completed earlier.

The SDGs were adopted after one of the largest consultation exercises in UN history. The goals were proposed in the United Nations Conference on Sustainable Development (***Rio+20***) in June 2012. The SDGs will be effective between 2016–2030. *Major highlights* of the SDGs are as given below:

(i) poverty eradication;
(ii) combating inequalities;
(iii) promoting gender equality, women and girl empowerment;
(iv) improving health and education;
(v) making cities more sustainable;
(vi) combating climate change;
(vii) protecting oceans and forests;
(viii) integrating the socio-economic and environmental dimensions;
(ix) global partnership for sustainable development;
(x) enhancing capacities of stakeholders in better quality measurement;

2. PBL, **Trends in Global CO2 Emissions 2015 Report,** Netherlands Environmental Assessment Agency, as quoted by the **Economic Survey 2015–16,** Vol. 2 (New Delhi: Government of India, 2016), pp. 177–178.

(xi) compilation of data or information on sustainable development; and

(xii) effective follow-up and review architecture.

In comparison to the MDGs, the SDGs are very comprehensive with provisions of indicators for all of its 169 targets which need a proper monitoring mechanism—a challenge for the countries of the world. Financing the goals will be another challenge in this regard.

INDIA AND THE SDGS

India's draft national SDG indicators are being developed by Ministry of Statistics and Programme Implementation with inputs from Central Ministries and various other stakeholders and are now at an advanced stage of finalization. Going forward, a *monitoring* and *reporting* system will be set up to regularly take stock of the implementation process and generate credible information and evidence on progress of the SDGs with the *base year* as 2016. In the process of implementation, the NITI Aayog will collect, validate and document best practices.

PARIS AGREEMENT (COP 21)

The 21st Conference of Parties *(COP 21)* under the UNFCCC (United Nations Framework Convention on Climate Change) took place in Paris by December 2015. The Paris Agreement on post-2020 actions on climate change will succeed the *Kyoto Protocol*. Unlike the Kyoto Protocol, it provides a framework for all countries to take action against climate change. Placing emphasis on concepts like climate justice and sustainable lifestyles, the Paris Agreement for the ***first time*** brings together all nations for a common cause under the UNFCCC. One of the main focus of the agreement is to hold the increase in the global average temperature to well below 2°C above pre-industrial level and on driving efforts to limit it even further to 1.5°C.

The Agreement comprises of 29 articles and is supported by 139 decisions of the COP. It covers all the crucial areas identified as essential for a comprehensive and balanced agreement, including mitigation, adaptation, loss and damage, finance, technology development and transfer, capacity building and transparency of action and support.

A marked departure from the past is the Agreement's *bottom-up approach*, allowing each nation to submit its own national plan for reducing greenhouse gas emissions, rather than trying to repeat a top-down approach advocated by the Kyoto Protocol, giving each country an emission reduction target. ***Salient features*** of the Agreement[3]:

(i) It acknowledges the development imperatives of developing countries by recognising their right to development and their efforts to harmonize it with the environment, while protecting the interests of the most vulnerable.

(ii) It seeks to enhance the 'implementation of the Convention' while reflecting the principles of equity and CBDR-RC (Common but Differentiated Responsibilities and Respective Capabilities), in the light of different national circumstances.

(iii) Countries are required to communicate to the UNFCCC climate action plans known as nationally determined contributions (NDCs) every five years. Each Party's successive NDC will represent a progression beyond the Party's then current NDC thereby steadily increasing global effort and ambition in the long-term.

(iv) It is not mitigation-centric and includes other important elements such as adaptation, loss and damage, finance,

3. Ministry of Finance, **Economic Survey 2015-16**, Vol. 2, pp. 179–181.

technology development and transfer, capacity building and transparency of action and support.

(v) Developed countries are urged to scale up their level of financial support with a complete road map towards achieving the goal of jointly providing US$ 100 billion by 2020. At the same time, a new collective quantified goal based on US$ 100 billion floor will be set before 2025.

(vi) It mandates that developed countries provide financial resources to developing countries. Other Parties may also contribute, but on a purely voluntary basis.

(vii) Developed countries are urged to take the lead in mobilization of climate finance, while noting the significant role of public funds in the mobilization of finance which should represent a progression beyond their previous effort.

(viii) It includes a robust transparency framework for both action and support.

(ix) Starting in 2023, a global stock-take covering all elements will take place every five years to assess the collective progress towards achieving the purpose of the Agreement and its long-term goals.

(x) It establishes a compliance mechanism, overseen by a committee of experts that operates in a non-punitive way, and is facilitative in nature.

Multilateral climate change negotiations are primarily focused on framing rules and regulation to implement the Paris Agreement (COP 21). This task began in Marrakesh, Morocco in (*COP 22*, 7-19 November, 2016) where the countries agreed to complete and finalize the rulebook by December 2018 (i.e., ***COP 24***, 3-14 December, 2018, in Poland). The work programme under the Paris Agreement was advanced by the parties at the COP 23. Major **takeaways for India** from ***COP 23*** (Bonn, Germany, 6-17 November, 2017) have been[4]:

(i) The agenda of pre-2020 climate change commitments and implementation have found a significant place in COP 23 outcome in the form of a decision with steps for future action on pre-2020 action and ambition.

(ii) The decision emphasizes that enhanced pre-2020 actions can lay a solid foundation for enhanced post-2020 ambition.

India, at the conference, was able to preserve differentiation taking positions on all important issues related to implementation of the Paris Agreement such as—nationally determined contributions; adaptation communication; transparency in framework; global stocktake; compliance; technology framework;, finance and capacity building prepared for further work on rules, modalities and guidelines.

GREEN FINANCE

In the past few years, the term 'green finance' has gained a lot of attention across the world. The idea gets its first mention in the UN document at the UN Conference on Sustainable Development (also known as *Rio+20*), 2012. Though it lacks an universal definition, green finance mostly refers to financial investments in projects and initiatives that encourage more sustainable economy.

There is no universal *definition* of green finance, though, it mostly refers to financial investments flowing towards sustainable development projects and initiatives that encourage the development

4. ***Economic Survey 2018-19***, Vol. 2, Ministry of Finance, GoI, N. Delhi, p.76.

of a more sustainable economy[5]. By now, several working definitions have come up—China's Green Credit Guidelines; the Climate Bonds Taxonomy of Green Bonds; the International Development Finance Club's (IDFC) approach to reporting on green investment; the World Bank/International Finance Corporation's (IFC) Sustainability Framework; and the UK Green Investment Bank Policies.

Current definitions in use reveals sizeable variance—clean energy; energy efficiency; green buildings; sustainable transport; water and waste management; greening the banking system, the bond market and institutional investment; as well as areas of controversy such as nuclear and large-scale hydro energy, bio-fuels and efficiency gains in conventional power.

The World Bank Group has set up an informal *Sustainable Banking Network* of banking regulators, led by developing countries, to promote sustainable lending practices. In 2015, green bonds issued by governments, banks, corporates and individual projects amounted to US$42 billion.

At the global level, more than 20 stock exchanges have issued guidelines on environmental disclosure, and many green indices and green ETFs (exchange-traded funds) have been developed. A growing number of institutions, including the Bank of England and Bank of China (Industrial and Commercial Bank of China), have begun to assess the financial impact of climate and environmental policy changes. Germany, the US and the UK have developed interest subsidy and guarantee programmes for green financing, and over a dozen government-backed green investment banks are operating globally. The G-20 has also recently set up a GFSG (green finance study group). The issue of mobilising *private finance* for transforming into a green global economy appeared at different global fora including the G20. Experts believe that for developing countries like India, private finance will not readily be forthcoming and public finance (both international and domestic) needs to be used to leverage private finance.

India and Green Development: Green finance is yet to pick up in India. Attaining the ambitious solar energy target, development of solar cities, setting up wind power projects, developing smart cities, providing infrastructure which is considered as a green activity and the sanitation drive under the 'Clean India' or 'Swach Bharath Abhiyan' are all activities needing green finance.

India created a corpus called the NCEF (National Clean Energy Fund) in 2010-11 out of the cess on coal produced/imported ('polluter pays' principle) for the purpose of financing and promoting clean energy initiatives and funding research in the area of clean energy. Some of the projects financed by this fund include innovative schemes like—

(i) a green energy corridor for boosting the transmission sector;

(ii) Jawaharlal Nehru National Solar Mission's (JNNSM) installation of solar photovoltaic (SPV) lights and small capacity lights, installation of SPV water pumping systems, SPV power plants, grid-connected rooftop SPV power plants; and

(iii) pilot project to assess wind power potential.

By **March 2018,** most of the banks had issued *green bonds* in India. Proceeds from these bonds are mostly used for funding renewable energy projects such as solar, wind and biomass projects and other infrastructure sectors, with infrastructure and energy efficiency being considered as green in their entirety. By early 2016, the SEBI (Securities and Exchange Board of India) approved the guidelines for green bonds. India needs to take care of ***certain***

5. ***Green Finance Study Group***—as quoted by the Ministry of Finance, **Economic Survey 2015–16**, Vol. 2, pp. 182-83.

issues[6] involved with the mobilisation of green finance:

(i) For a developing country like India, poverty alleviation and development are of vital importance and resources should not be diverted from meeting these development needs. Green finance should not be limited only to investment in renewable energy, as, for a country like India, coal based power accounts for around 60 per cent of installed capacity. Emphasis should be on *greening coal technology*. In fact, green finance for development and transfer of green technology is important as most green technologies in developed countries are in the private domain and are subject to intellectual property rights (IPRs), making them cost prohibitive.

(ii) Green bonds are perceived as new and attach higher risk and their tenure is also shorter. There is a need to reduce risks to make them investment grade.

(iii) There is also a need for an internationally agreed upon definition of green financing as its absence could lead to over-accounting.

(iv) While environmental risk assessment is important, banks should not overestimate risks while providing green finance.

(v) Green finance should also consider unsustainable patterns of *consumption* as a parameter in deciding finance, particularly conspicuous consumption and unsustainable lifestyles in developed countries.

CLIMATE FINANCE

World is alive to the compulsion of combating climate change as unmitigated climate change risks pose irreversible costs. Complexity arises in the case of financing for addressing adaptation and mitigation of GHG emissions. Provision of finance is embedded in the convention and has also been mentioned in the *Paris Agreement* for addressing the adaptation and mitigation needs of developing countries. Tracking of climate finance is equally important. Lack of a clear **definition** of climate finance has led to controversies in recent estimates of climate finance.

The *Climate Finance in 2013-14 and the US$100 Billion Goal* report released (late 2015) by the OECD (Organisation for Economic Co-operation and Development) states that the mobilization of climate finance from developed to developing countries had reached US$62 billion in 2014. The report seems to include the full value of multilateral development bank (MDB) loans as well as official development assistance (ODA), some private finance, export credits, etc. as climate finance, leading to double counting. Also it includes the promises, pledges and multi-year commitments and not actual disbursements as climate finance. The decline in allocation of ODA to the least developed countries (LDC) in the past year, could perhaps be linked to higher allocation to 'climate-related objectives', implying that ODA is being diverted to 'climate-related activities'.

The Paris Agreement mandates that transparent and consistent information on support provided and mobilized through public interventions for developing country Parties be provided by developed countries. However, it is silent on the definition of climate finance. While the question of what counts as climate finance would be decided at a later stage by the Standing Committee on Finance under the UNFCCC, it is important that it should highlight certain basic elements like[7]—

6. Ibid., Vol. 2, pp. 182–83.

7. Ibid., pp. 185–86.

(i) sources of funding, terms of funding and purpose of funding in addition to resources being committed/disbursed/new.

(ii) while defining climate finance, it is also important to define what cannot be counted towards climate finance.

(iii) aid money meant for development purpose should not be counted as climate finance. With reference to funds provided for multiple purposes, only the share provided solely for climate change should be included under climate finance.

(iv) systems should be in place to check for double counting or treatment of ODA as climate finance.

There is an even greater gap in tracking adaptation finance and segregating it from development funds as a whole—as a result, very often the entire amount allocated to a project is erroneously treated as adaptation finance. Any climate finance tracking exercise needs to carefully account for these problems.

Global Climate Funds

Depending on the participating countries, global climate funds can either be multilateral or bilateral depending on. The funds may further be classified according to their area of focus, namely mitigation, adaptation or REDD (reducing emissions from deforestation and forest degradation). Currently, the Green Climate Fund (GCF) is the largest, with pledges amounting to US$10.2 billion. The second largest is the Clean Technology Fund (CTF) with pledges amounting to US$5.3 billion. With the capitalization of the GCF and the sunset clause of the CTF, there is ambiguity about the role of the CTF in the climate finance architecture post-2020.

GCF

It was established as an operating entity of the financial mechanism of the UNFCCC in 2011 and is expected to be a major channel for climate finance from developed to developing countries. It has so far been pledged US$10.2 billion by 38 governments. These include some developing countries with small contributions. The highest contribution of US$3 billion has been announced by the USA, followed by Japan (US$1.5 billion), the UK (US$1.2 billion), France (US$1.03 billion) and Germany (US$1.0 billion). The initial resource mobilization period extends from 2015 to 2018. At the 11th GCF board meeting (November 2015), the board approved commitment of US$168 million to eight specific projects, subject to certain conditions being met by the project proponents. The board aims to approve US$2.5 billion in commitments to additional projects in 2016.

GEF

The GEF (Global Environment Facility) was established as a *pilot programme* for environmental protection. The current project cycle is GEF-6 over the years 2014-18. In 1992, when the Biodiversity and Climate Change Conventions were adopted at *Rio de Janeiro*, the GEF was adopted as a financial mechanism for helping developing countries meet their financing needs for achieving their climate change goals. As of November 2015, the GEF has directly invested a total of US$14.5 billion in 3946 projects in 167 countries.

SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE IN THE INDIAN CONTEXT

In the past two decades, the key environmental challenges in India have been sharper. *The State of the Environment Report* by the MoEF clubs the issues under five key challenges faced by India—

(i) Climate Change,
(ii) Food Security,
(iii) Water Security,
(iv) Energy Security, and
(v) Managing Urbanisation.

Climate change is disturbing the natural ecosystems and is expected to have substantial adverse effects in India, mainly on agriculture (on which 58 per cent of the population still depends for livelihood), water storage in the Himalayan glaciers which are the source of major rivers and groundwater recharge, sea-level rise, and threats to a long coastline and habitations. Climate change will also cause increased frequency of extreme events such as floods, and droughts. These in turn will impact India's food security problems and water security. As per the *Second National Communication* submitted by India to the UNFCCC, it is projected that the annual mean surface air temperature rise by the end of the century ranges from **3.5°C to 4.3°C,** whereas the sea level along the Indian coast has been rising at the rate of about **1.3 mm/year** on an average. These climate change projections are likely to impact human health, agriculture, water resources, natural ecosystems and biodiversity.

Concerned of the threats imposed by climate change and pressures on natural resources, sustainability and environment are increasingly taking centrestage in the Indian policy domain. India has been part of 94 multilateral environmental agreements. India has also voluntarily agreed to reduce its emission intensity of its GDP by 20–25 per cent over 2005 levels by 2020, and emissions from the agriculture sector would not form part of the assessment of its emissions intensity. Indian economy is already moving along a lower carbon and sustainable path in terms of declining carbon intensity of its GDP which is expected to fall further through lower carbon strategies. It is estimated that India's per capita emission in 2031 will still be lower than the global per capita emission in 2005 (in 2031, India's per capita GHG emissions will be under 4 tonnes of carbon dioxide equivalent (CO 2 eq.) which is lower than the global per capita emissions of 4.22 tonnes of CO^2 eq. in 2005).

Together with the national efforts in different sectors, India also recognises that rural areas are equally prone to stress and pressures from natural resource exploitation. In this context, schemes for rural development and livelihood programmes are very relevant. A vast majority of the works under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) are linked to land, soil, and water. There are also programmes for non- timber forest produce-based livelihood, promotion of organic and low-chemical agriculture, and increased soil health and fertility to sustain agriculture-based livelihoods. These schemes help mobilise and develop capacities of community institutions to utilise natural resources in a sustainable manner and their potential can be further developed.

Along with efforts to incorporate sustainability in the rural development process, India is increasingly making efforts to integrate the three pillars of sustainable development into its national policy space. In fact, environment protection is enshrined in our Constitution (Articles 48 A and 51A]). Various policy measures are being implemented across the domains of forestry, pollution control, water management, clean energy, and marine and coastal environment. Some of these are policies like Joint Forest Management, Green Rating for Integrated Habitat Assessment, Coastal Zone Regulation Zone, Eco Labelling and Energy Efficiency Labelling, Fuel Efficiency Standards etc. Over a period of time, a stable organisational structure has been developed for environment protection.

INDCs

The INDCs (Intended Nationally Determined Contributions) are plans by governments communicated to the UNFCCC regarding the steps they will take to address climate change domestically. As per the *COP 19* decision (Warsaw 2013), all Parties were requested to prepare their INDCs, without prejudice to the legal nature of the contributions towards achieving the objectives of the Convention and communicate well in advance of COP 21.

India's INDC: India submitted its INDC to the UNFCCC by early October 2015. It is comprehensive and covers all elements, i.e. adaptation, mitigation, finance, technology and capacity building. India's goal is to reduce the overall emission intensity and improve the energy efficiency of its economy over time. It also covers concerns to protect the vulnerable sectors and segments of its society. The ***highlights*** of India's INDC are as given below[8]:

(i) To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.

(ii) To adopt a climate friendly and cleaner path than the one hitherto followed by others at a corresponding level of economic development.

(iii) To reduce the emissions intensity of its GDP by 33 to 35 per cent of the 2005 level by 2030.

(iv) To achieve about 40 per cent cumulative electric power installed capacity from non-fossil fuel- based energy resources by 2030 with the help of transfer of technology and low cost international finance including from the Green Climate Fund (GCF).

(v) To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.

(vi) To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, the Himalayan region, coastal regions, health and disaster management.

(vii) To mobilize domestic and new and additional funds from developed countries for implementing these mitigation and adaptation actions in view of the resources required and the resource gap.

(viii) To build capacities, create a domestic framework and an international architecture for quick diffusion of cutting-edge climate technology in India and for joint collaborative R&D for such future technologies.

India's Challenges and Efforts: India houses 30 per cent of the global poor, 24 per cent of global population without access to electricity, and 92 million people without access to safe drinking water. Coupled with its vulnerability in terms of the impact of climate change, this entails that India faces formidable and complex challenges in terms of balancing the sustainable development agenda. Given the challenges it faces, it has prepared an ambitious plan in terms of clean energy, energy efficiency and lower emission intensity while addressing the critical issue of poverty and food security[9]—

(i) India's INDC sets ambitious renewable energy targets mainly in terms of solar and wind energy. With a potential of more

8. Ibid., pp. 183–84.

9. ***Economic Survey 2016-17***, Vol. 1 and ***Economic Survey 2015-16***, Vol. 2, Government of India, Ministry of Finance, N. Delhi.

than 100 GW, the target is to achieve 60 GW of wind power and 100 GW of solar power installed capacity by 2022. Given that in 2014 the world's entire installed solar power capacity was 181 GW, this target is extremely ambitious and clearly places India as a major potential renewable energy player *(World Resource Institute, October 2015).*

(ii) India has also launched a historic *International Solar Alliance (ISA)* which is envisaged as a coalition of solar resource-rich countries to address their special energy needs and will provide a platform to collaborate on addressing the identified gaps through a common, agreed approach.

(iii) Although there is lot of emphasis on boosting the renewable energy sector, the INDC clearly state that coal would continue to be the dominant source of power generation in the future. However, the INDC incorporates a lot of initiatives to improve the efficiency of coal-based power plants and to reduce their carbon footprint. *Clean coal technologies* would be critical to meeting the demand for power generation in the future.

(iv) In addition to mitigation-related activities, the INDC also incorporates adaptation-related activities. Out of the eight National Missions on Climate Change in India, five focus on *adaptation* in sectors like agriculture, water and forestry.

(v) Since June 2014, when international oil prices started declining, India has increased its excise duties from Rs. 15.5 per litre to Rs. 22.7 per litre as of *December 2016* for branded petrol and from Rs. 5.8 per litre to Rs. 19.7 per litre for branded diesel. The results of the climate change effort undertaken by the major G-20 countries and India are striking—the increase in petrol tax has been over 150 per cent in India. In contrast, the governments of most advanced countries have simply passed on the benefits to consumers, setting back the cause of curbing climate change. As a result, India now outperforms all the countries except those in Europe in terms of tax on petroleum and diesel.

(vi) Having decisively moved from a regime of carbon subsidies, it is now de facto imposing a *carbon tax* on petroleum products at about US$ 150 per ton, which is about 6 times greater than the level recommended by the 'Stern Review on Climate Change'.

(vii) India is faring relatively better to other countries at comparable stages of economic development in terms of the 'share of fossil fuel use in overall energy consumption'. India's reliance on fossil fuels remains well below China (the most relevant comparator) but also below the US, UK and Europe at comparable stages of development—this echoes India's commitment to never exceed the per capita emission of advanced countries.

Mobilising *finance* is critical to achieving the ambitious targets set by India. Preliminary estimates suggest that at least US$ 2.5 trillion (at 2014-15 prices) will be required for meeting India's climate change action under the INDC between now and 2030. While the maximum share of the country's current climate finance comes from *budgetary* sources, India is not relying solely on them and is experimenting with a careful mix of market

mechanisms together with fiscal instruments and regulatory interventions. However, it needs to be emphasized that international finance is a critical enabler for the scaled up climate action plans.

INDIA AND CLIMATE CHANGE

India's concerns and actions towards climate change appear in its policies by early 1997 itself when it officially accepted the idea of sustainable development. Since then, several sectoral initiatives have been take by the country. By 2008, India had launched its eight national missions on climate change. Over the time, India has not only played a very dynamic role at the international fora but it has also taken appreciable domestic efforts in this direction[10]—

NAPCC: A major component of India's domestic actions against climate change is the National Action Plan on Climate Change (NAPCC). In 2017-18, the PM's Council on Climate Change (PMCCC) directed the missions under the NAPCC to enhance their ambition in respect of adaptation, mitigation and capacity building and reprioritize them, besides recommending the setting up of some *new missions* in addition to the existing eight:

(i) Considering the adverse impacts that climate change could have on health, a new 'Mission on Climate Change and Health' is currently under formulation and a National Expert Group on Climate Change and Health has been constituted.

(ii) The proposed 'Waste-to-Energy Mission' will incentivize efforts towards harnessing energy from waste and is aimed at lowering India's dependence on coal, oil and gas for power production.

(iii) The 'National Mission on Coastal Areas' (NMCA) will prepare an integrated coastal resource management plan and map vulnerabilities along the entire (nearly 7000-km-long) shoreline.

(iv) The 'Wind Mission' seeks to increase the share of wind energy in the renewable energy mix of India. It is likely to be given an initial target of producing about 50,000–60,000 MW of power by the year 2022.

SAPCC

The State Action Plans on Climate Change (SAPCC) aim to create institutional capacities and implement sectoral activities to address climate change. These plans are focused on adaptation with mitigation as co-benefit in sectors such as water, agriculture, tourism, forestry, transport, habitat and energy. So far, 28 states and 5 union territories (UTs) have submitted their SAPCCs to the MoEF and CC (Ministry of Environment and Climate Change). Out of these, the SAPCCs of 32 states and UTs have been endorsed by the National Steering Committee on Climate Change (NSCCC) at the MoEF&CC.

NAFCC

A National Adaptation Fund for Climate Change (NAFCC) has been established with a budget provision of Rs. I350 crore for the years 2015–16 and 2016–17. It is meant to assist in meeting the cost of national- and state-level adaptation measures in areas that are particularly vulnerable to the adverse effects of climate change.

10. Based on various documents of the Government of India including the ***Economic Survey 2015–16*** and ***Economic Survey 2016-17.***

The *overall aim* of the fund is to support concrete adaptation activities that reduce the adverse effects of climate change facing communities, sectors and states but are not covered under the ongoing schemes of state and central governments. The adaptation projects contribute towards reducing the risk of vulnerability at community and sector level.

Coal Cess and the National Clean Energy Fund

India is *one of the few countries* around the world to have a *carbon tax* in the form of a cess on coal. Not only has India imposed such a cess but it has also been progressively increasing it (form Rs. 50 per tonne of 2010 to Rs. 200 by 2015–16 and Rs. 400 by 2016-17). The NCEF (National Clean Energy Fund) which is supported by the cess on coal was created for the purposes of financing and promoting *clean energy initiatives*, funding research in the area of clean energy and for any other related activities.

Perform Achieve and Trade

The PAT (Perform Achieve and Trade) scheme under the National Mission on Enhanced Energy Efficiency was introduced as an instrument for reducing specific energy consumption in energy-intensive industries with a market-based mechanism that allowed the trading of *ESCerts* (energy saving certificates). The ESCerts, issued by the GoI, are traded through the power exchanges in the country.

Renewable Energy

For India, renewable energy has become a major focus area. The GoI has set an ambitious target of achieving 40 per cent cumulative electric capacity from non-fossil fuel-based energy resources by 2030. India is currently undertaking *the largest* renewable capacity expansion programme in the world.

Major highlights regarding it are as given below:

(i) Renewable energy capacity target has been increased to 175GW by the year 2022, out of which 100GW is to be from solar, 60 GW from wind, 10 GW from biomass and 5 GW from small hydro power projects.

(ii) The First *RE-INVEST* (Renewable Energy Global Investment Promotion Meet and Expo) were organized in February 2015 to provide a platform for the global investment community to connect with stakeholders in India.

The objective of the RE-INVEST series of conference expos is to showcase India's renewable energy potential and the government's efforts to develop and scale up the country's installed renewable energy capacity to meet the national energy requirement in a socially, economically and ecologically sustainable manner. A total of 273,000 MW green commitments, including 62,000 MW of renewable manufacturing, were received in the event.

(i) The *ISA (International Solar Agency)* was launched by India at COP 21 in Paris in December 2015. The ISA will provide a special platform for mutual cooperation among 121 solar-resource-rich countries lying fully or partially between the Tropic of Cancer and Tropic of Capricorn. The Secretariat of the ISA will be hosted by India.

(ii) Development of *Solar Cities Programme* is another ambitious scheme of India. Under it 56 solar cities projects have been approved.

(iii) *Solar Parks* (32 such parks approved by February), each with the capacity of 500 MW and above.

(iv) *Ultra Mega Solar Power Projects* to be developed in the next five years in various states.

(v) *National Offshore Wind Energy Policy 2015* is another major renewable energy policy initiative. It aims at helping offshore wind energy development, including setting up of offshore wind power projects and research and development activities in waters, in or adjacent to the country, up to the seaward distance of 200 nautical miles exclusive economic zone (EEZ) of the country from the base line.

(vi) *Accelerated Depreciation Benefits* scheme for wind power projects have been restored by the GoI in 2016 (which were withdrawn in July 2014). This will help in creating a robust manufacturing base for *wind turbines* in the country.

(vii) To provide adequate amount of investment, the Reserve Bank of India has included renewable energy in the *PSL* (priority sector lending) for scheduled commercial banks.

(viii) The new *National Tariff Policy* (January 2016) for electricity has a focus on the environmental aspect with major provisions such as *(Economic Survey 2016-17)*—

- 8 per cent of electricity consumption (excluding hydro power) shall come from solar energy by March 2022;
- New coal/lignite based thermal plants to establish/procure/purchase renewable capacity;
- Bundling of renewable power with power from plants whose Power Purchase Agreements have expired or completed their useful life;
- No inter-state transmission charges for solar and wind power;
- Procurement of 100 per cent power produced from 'waste-to energy' plants;
- Ancillary services to support grid operation for expansion of renewable energy, etc.

FUTURE OUTLOOK

India has been amongst the ***six*** most vulnerable[11] countries in the world by the *Global Climate Risk Index 2018*. The areas which are prone to climatic shifts have high population living in poverty involved in climate-sensitive occupations. In such a situation climate change could have significant implications for living standards. The effects of climate change will vary significantly depending on the level of exposure and the inherent adaptive capacities the people, households and communities.

India's efforts on sustainable development and climate change have ensured several positive outcomes. Though, mobilising suitable amount of financial support is getting quite difficult for the country, climate change policies have been given high importance by the Government. Climate change has been outlined as an important aspect of policy consideration by the 15th Finance Commission also.

Global multilateral attempts and related obligations of the long-term fund support have not been fulfilled in any meaningful way. Fund uncertainties are not good for checking climate change. India believes that it is necessary for

11 ***Economic Survey 2018-19***, Vol. 2, Ministry of Finance, GoI, N. Delhi, p.79.

developed countries to be compliant on their commitments based on historical responsibilities and the principle of equity and common but differentiated responsibilities.

EPILOGUE

Hardly anything makes economic sense unless its continuance for a long time can be projected without running into absurdities. Growth and development can happen to a 'limited objective', but it cannot be stretched upto an 'unlimited extent'. How can the 'finite' earth support mankind's 'infinite' physical needs?—long before this was postulated by the 'Club of Rome' in 1972, exactly the same thing Gandhiji had said in late thirties itself, 'Earth provides enough to satisfy every man's need, but not for every man's greed'. Mankind needs to introspect not only about its present needs but the way those needs are being met.

Besides, we also need to 'differentiate' between our 'needs' and 'aspirations'. Our physical needs have a direct 'link' with the resources we have at our disposal to meet them. If mankind is to survive and prosper, we need to be aware of the repercussions of our activities on Mother nature.[12]

12. These virtuous opinions can be seen in a number of contemporary thinkers and writers since 1970s:

E. F. Schumacher, ***'The Economics of Permanence',*** *Resurgence,* 3(1), May/June 1970, reprinted in Robin Clarke, Editor, ***'Notes for the Future: An Alternative History of the Past Decade' (London:*** Thames and Hudson, 1975. Schumacher invoked Gandhi while advocating for the 'economics of permanence'.

Jeffery Sachs, ***Common Wealth: Economics for a Crowded Earth*** (London: Penguin Books, 2009, pp. 29–35, pp. 55–155.

Jeffery Sachs, ***The End of Poverty*****,** Penguin Books, 2005, pp. 280-284.

Tim Harford, ***'The Undercover Economist'*****,** Abacus, GB, London, 2006, pp. 90-104.

Thomas L. Friedman, *'**The World is Flat'***,* Penguin Books, GB, London, 2006, pp. 383-385, pp. 495-504

Ramachandra Guha, *' **The Ecology of Affluence'*** in ***'The Ramachandra Guha Omnibus'*****,** Oxford University Press,N. Delhi, 2005, pp. 69-97.