

Comparing Intended Nationally Determined Contribution (INDC) of developing countries: China, India, Brazil and Mexico

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INTRODUCTION:-

Climate change is one of the biggest problems that the present generation faces today. It is widely acknowledged that current concentration of greenhouse gases is an adverse outcome of the industrial revolution, which has disrupted the global climate balance. The developing nations believe that the developed nations are responsible for this mess and should act on moral obligations to clean it. However, the developed nations assert that global cooperation and coordination would be needed to act against climate change.

Many negotiations initiated by the United Nations in the past have not resulted in the desired outcomes. The withdrawal of the United States, the failure of the Kyoto protocol and the subsequent conferences (Copenhagen in 2009, Cancun in 2010, Durban in 2011, and Doha in 2012) have highlighted a requisite for global cooperation to address climate change. To address the problem of global cooperation in Paris Conference in December 2015, countries have been asked to publicly declare GHG emission cuts they intend to adopt under a new 'common but differentiated responsibility' agreement. The intended nationally determined goals aim to integrate the

top- bottom approach of UNFCCC with bottom- up approach, by asking the countries to outline the steps to reduce emission as per their national circumstances, capabilities and priorities, and to limit the global temperature rise to 2 degree Celsius above pre industrial levels. The submitted INDC goals of countries will be assessment and reviewed, if required before the Paris summit in December 2015. All countries will enter into a legally binding universal agreement on climate change at the Paris summit, which would be the first among all the UN negotiations.

As the earth's temperature rises with time, countries with agrarian population, diverse biodiversity, and expansive coastal areas are primarily vulnerable to the effects of climate change. Most of the vulnerable countries are either under-developed or developing, and hence face a difficult tradeoff between economic growth and social development in their policy matrix. It would be interesting to study how the vulnerable developing countries have addressed this policy trade off in their climate action plan. Hence this paper attempts to study the steps India, China, Brazil and Mexico have taken to reduce emissions at national level as per their INDC reports.

Each country, in its report to UNFCCC, has categorized its climate change plan into – mitigation target, adaptation strategy, financing and national policies to battle climate change and this study aims to compare the above stated strategy of the four countries. The flow of this paper is as follows: section 1 will look at mitigation targets, section 2 will study adaptation strategy, section 3 will reveal their financing strategies, and section 4 will look at each country's national policy to achieve targets. Finally, section 5 analyses each strategy and further concludes.

1. MITIGATION

India

India has committed to reduce emission intensity of its GDP by 33 to 35 percent (from 2005 levels) and achieve 40% electricity power installed capacity from non fossil fuel based resources by 2030. India will increase forest cover and create an additional carbon sink of 2.5 to 3 billion tones of CO₂.

China

China intends to lower emissions (CO₂) per unit of GDP by 60% to 65% from 2005 levels by 2030, considering its development stage, national circumstance and international responsibility. Further, it will increase the share of non fossil fuel consumption to 20% and enlarge its forest stock by 4.5 billion cubic meters by 2030.

Brazil

Brazil will commit to decrease its greenhouse gas emission (CO₂, CH₄, N₂O, perfluorocarbons, hydrofluorocarbons and SF₆) by 37% below 2005 levels in 2025, and by 43% in 2030. However, it has committed to 2025 targets only; the other is for reference purpose. The Brazilian government has clearly stated in its report that it would use inventory based approach to calculate anthropogenic greenhouse emissions as per the IPCC guidelines. Moreover, it has reserved its right to use any market mechanism established under the Paris agreement, subject to approval by the federal government and rejected to recognize mechanisms formulated outside the UNFCCC.

Mexico

The INDC of Mexico has two components on mitigation i.e. unconditional mitigation and conditional mitigation. Mexico Is resolute on reducing 25% of its Green house gases and short lived climate pollutants (SLCP) emissions unconditionally till

2030. This commitment implies reducing GHG emissions by 22% and black carbon emissions by 51%. Mexico has conditioned its commitment to increase reduction from 25% to 40%, subject to technical cooperation, international carbon price, carbon border adjustment and financial resources. This would imply a reduction of GHG emission up to 36% and Black carbon to 70%. The scope of the pollutants includes black carbon, sulphur hexafluoride, Perfluorocarbons, Hydrofluorocarbons, Nitrous oxide, methane and carbon dioxide.

2. ADAPTATION

India:

Five of the eight national missions focus on adaptation in sectors like agriculture, water, coastal areas, forestry, capacity building and knowledge management. India being an agrarian economy has launched soil health card scheme to setup 100 soil testing laboratories to help farmers adapt the new soil formations. Parampargat Krishi vikas Yojana has been launched to promote organic farming practices and pradhanmantra Krishi Sinchayee Yojana is rolled out to take care of efficient irrigation practices. National mission for clean Ganga has been prime ministers favorite, which aims to revive the river Ganga. Give it up campaign, instigated to give up subsidy on cooking gas to meet the needs of the poor, has met wide success rate of 20000 people giving up every day. Realizing the importance of water, national bureau of water use efficiency and Neeranchal have been set up for promotion, regulation and control efficient use of water.

China

In accordance with the CoP 21, China aims to strengthen international cooperation on its national adaptation and implementation schemes. It expects the developed countries to

provide support and expertise to developing countries, which are facing immense challenges in conforming to their adaptation needs. A subsidiary body on adaptation to climate change should be set up, that links technology, capacity building, finance and adaptation. China will propose to strengthen Warsaw international mechanism on loss and damage, 2013.

China will put sincere efforts to increase afforestation by voluntary tree plantation, environment programs, restoring forest and grass land from farmland, planting shelter belts. It will look to strengthen forest disaster prevention, forest resource protection, restoration of wetlands and increase carbon storage capacity of wetlands.

The Chinese government wishes to enhance education to adapt a low carbon way of life. It will encourage public institutions to take the first steps to advocate low carbon consumption. It will enhance overall climate resilience by improving policies on water security, water management, irrigation facilities, warning and risk management systems, and public health and food security.

Brazil

The Brazilian government recognizes adaptation is nucleus in addressing climate change. By focusing on the social dimension, the government intends to reduce vulnerability (population, ecosystem, infrastructure and production systems) through better ecosystem services. National adaptation fund, which aims to implement knowledge management systems, promote research and development and develop process and tools to support adaptation strategies, will be used to design future policies. The NAF will focus primarily on building sustainable urban infrastructure because of the rapidly increasing urbanization. However NAP would also focus on improving health and living conditions of the poor population, water

security, protecting biodiversity by forest codes and assigning protected areas and assessing climate risks.

Mexico

The INDC report highlights the importance of adaptation in Mexico's climate change policy. As Mexico is located between two oceans, it is highly vulnerable to hydro meteorological events. It has suffered many extreme events such as cyclones, floods and droughts that have led to loss of human and environment health. The adaptation strategies on social sector, ecosystem and infrastructure will be carried out from 2020 to 2030.

The government's primary agenda is to battle poverty, which is a determining factor of social vulnerability. This will involve programs on food security, water access, capacity building by a participatory society in climate change planning, warning systems, gender equality, and public health and relocating people from disaster prone areas.

Large ecosystem provide vast amount of environment services such as carbon sequestration, provision and maintenance of water, reduction in meteorological disasters. The actions to be implemented in conserving the ecosystem are- 0% deforestation, reforest high, medium and low watersheds, conserve and restore natural protected areas, protect endangered species, increase carbon capture , improve marine ecosystems and guarantee integral water management of water.

Climate change poses a significant risk on strategic infrastructure and productive systems. Adaptation strategies include execution of infrastructure relocation programs, incorporating adaption criteria for public projects, urban and industrial waste water treatment, application of norms on environment protection on buildings, diversification of sustainable agriculture.

3. FINANCE:-

India

India will mobilize domestic and international funds to support its climate change actions. Nationally, it will reduce subsidies on fossil fuel such as petrol, diesel and LPG, and impose coal cess to finance green projects. It will also setup National Adaptation Fund of 55\$ million for incorporating adaptation strategies. To fund renewable energy projects, the government will introduce tax free infrastructure bonds. India recognizes the importance of external cooperation through financing, technology transfer and capacity building in achieving its climate change targets.

China

To support its enhanced climate change plans, China will increase budgetary support for climate change. It would implement preferential tax policies for promoting new energy and improve green credit mechanism to encourage institutions for energy efficiency. The Chinese government will reform the pricing and taxation regime for energy/resource products. Moreover, China will also improve disaster insurance policy against climate change to protect its people from natural calamities.

The CoP 2015 agreement should encourage developed countries to supply new, additional and adequate sustained finance to developing countries for their climate change actions. Along with finance, the developed nations should also provide quantified targets and a blueprint to achieve them. China will require 100\$ billion of public finance (from developed nation) a year on from 2020 and such amount shall be increased yearly. Green climate fund (GCF) should be directed as per the convention's parties needs and be strengthened to form an important operating entity.

Brazil

Brazil's policy and measure are not dependent on any financial mechanism established in the convention or based on any international cooperation and support, and are of the view to increase effectiveness in implementation. However, in the forest sector, all the REDD+ activities (Reducing emission from deforestation and forest degradation) will function on a result based payments mechanism established in CoP 21. The government welcomes support from the international agency in technology development, diffusion, deployment and transfer. It will also initiate ties with the developing economies, especially with Portuguese speaking countries, in the areas of biofuels, low carbon and resilient agriculture, capacity – building and technology transfer and restoration and reforestation activities, and asks the developed nations to support such agreements. Further, Brazil highlights that it will remain flexible in its approach to achieve the objectives, and the information provided is for clarification purpose only.

Mexico:

Mexico will mobilize domestic funds to achieve its unconditional goals of 25%, whereas will need international support such as technology transfer, capacity building, finance to achieve conditional goal of 40%. Moreover, it has identified five areas where technology transfer is vital i.e. access to information system for preventing natural calamities, availability of methods and tools for impact assessment, transportation technology, water technology (saving recycling, sustainable consumption) and protection of coastal and river infrastructure. Mexico recognizes the importance of private investment in disaster prevention as well as a robust insurance market against catastrophic risks.

4. NATIONAL POLICIES FOR CLIMATE CHANGE:-

India:-

The government of India has put forward two approaches to cater to the rising energy demands while ensuring minimum carbon emission. On the generation side, increase use of renewable energy by exploiting solar and wind energy and transition to super critical technology for coal power plants. On the demand side, innovative policies are being framed to increase energy efficiency. India is promoting clean energy by having one of the largest renewable capacity expansion programs. As on 2002, the share of renewable energy mix was approximately 2 % (3.9GW), which has increased to 13 % (36GW) in 2015 and aims to produce 175GW of renewable energy as on 2022. India has taken an initiative to form international agency on solar policy and application, of all the countries lying between tropic of cancer to tropic of Capricorn.

India is poised to be a major solar power generating country in the world because of its geographical advantage. As on 2005, solar power installed capacity was 3.7 MW, which has multi folded into 4060 MW and further aims to install 100GW till 2022. India aims to set up 25 solar parks, canal top solar panels, solar pumps to farmers, ultra mega solar power plants and solarize 55,000 petrol pumps, of which 3135 have already been solarised. The government of India wants to also exploit its wind energy potential by increasing the installed capacity of 23.76 GW to 60GW by 2022. The national offshore wind policy has enabled the private sector to invest in offshore wind mills in the seas. Further, initiatives have been taken to harness biomass energy and increase installation capacity to 10GW by 2022 from the existing 4.4 GW (2015).

Since 60% (167GW) of the energy produced is still from coal power plants, policies are aimed towards the use of clean coal technology and stringent standards have been enforced upon them. It is mandatory for coal powered plants to use super

critical coal technology for the production of electricity. 144 old thermal power plants have been ordered to improve energy efficiency and life span. National program on smart grid has been launched for to and fro of electricity between the power plants and households. This would help to create a new market for selling electricity in India.

To enhance energy efficiency, the government of India has launched national mission for enhanced energy efficiency (NMEEE) to avoid addition capacity of 20 GW and save 23 million tons per year. NMEEE has taken the initiative of replacing incandescent bulbs with LED bulbs to save energy. Standards and labeling program has created awareness on energy consumption and this has reduced the energy efficiency of refrigerator and air conditioner by 25-30%. Venture capital fund for energy efficiency (VCFEE) has been set up to give loan to energy efficient products. A risk sharing mechanism, partial risk guarantee fund for energy efficiency (PRGFEE), has also been set up to assure partial risk of such loans. Energy conservation building codes have been drawn to set minimum energy standards for new buildings. The ECBC has been adopted in 8 states and over 300 commercial buildings have complied with it. India has also developed a new indigenous rating system, GRIHA based on 34 criteria such as planning, conservation, energy utilization.

The government has established a perform and achieve trade (PAT) mechanism to establish energy efficiency in 478 plants of 8 industries that consume 1/3rd of the energy produced. Dedicated freight corridors (DFC) have been introduced in the Indian railways to handle huge cargo between the west and east zones. National policy on Bio-fuel has been adopted a target of blending 20% in both bio-fuel and bio-ethanol. The government has identified *Jatropha curcus* as a worthy oilseed for bio-fuel. It is planned to all 5% bio-fuel to diesel in railways and defense.

China

To achieve such a majestic target of 65%, China needs to build on the existing policies, formulate new enhanced policies in sustainable production, consumption, science and technology, economic policy and international cooperation. To implement proactive national strategies, China will formulate and strengthen laws and regulations, integrate climate change objectives into economic and social plans, implement national program on climate change (2014-2020) and improve administration work in climate change related work.

Over the next few years, the Chinese government aims to identify tasks, targets and approaches for regional strategies on climate change. It would strictly control GHG emissions and carbon intensity in urbanized zones, and will strengthen planning, and construction of medium and small towns for focused development. The forest department will define ecological red lines for key ecological zones and introduce withdrawal mechanism for industries that do not keep up with environment standards.

In the energy sector, China aims to build low – carbon energy system by controlling total coal consumption, enhancing clean coal technology, developing wind, solar, natural gas, geothermal and bio – energy, and constructing smart grid. The Chinese government is keen on building energy efficient and low – carbon industrial system. This will be done by developing a circular economy, formulating stricter GHG emission standards, controlling emission from key sectors such as power, iron and steel, non ferrous metal and building materials. China has ambitious plans on developing a recycling based industrial and agriculture system for efficient utilization of resources.

In the construction sector, China will follow a new pattern of urbanization, which embodies the concept of low carbon emission from planning stage. Energy efficiency of buildings will be enhanced by improving the quality of construction, extending building life spans and promoting

reutilization of building wastes. China plans to improve public transportation system, quality of gasoline, pedestrians and freight transport system.

China will increase its support in Research and development of low carbon technology, water saving and desalination of water technology, early warning systems for bad weather, biological nitrogen fixation, green pest and disease prevention. Further, it will improve statistical and accounting system for GHG emission. China will adapt a market mechanism on carbon emission trading system and reporting and verifying system of carbon emission for efficient utilization of resources. It will look to further strengthen south – south cooperation.

Brazil

The mitigation policies of the Brazilian government, consistent with the IPCC guidelines and national conditions, comprise of broadly 3 steps:-

- Bio-energy.
 - Land use change and forests.
 - Low carbon energy supply.
1. Brazil has one of the most successful bio-fuel programs (with cogeneration of electricity). The government intends to increase share of bio-fuel in energy mix by 18% in 2030 by increasing ethanol supply, bio-diesel mix.
 2. Brazil has reduced the deforestation rate of the Brazilian Amazonia by 82% between 2004 and 2014. It will attempt to not only establish forest codes at federal, state and municipal levels, but also achieve zero illegal deforestation in Brazilian Amazonia by 2030. The Brazilian government considers restoring and reforestation 12 million hectares of forest by 2030 and promoting social forestry in native forest regions. ‘

3. The energy policy aims to increase the share of renewable from 40 %(at present) to 45 % in 2030. It aims to increase wind, solar and biomass energy to 23%, expand renewable except hydro power to 28 -33% and enhance efficiency by 10% in the electricity sector by 2030.

Other than its three major steps, policies will be undertaken to strengthen low carbon emission agriculture by restoring additional 15 million hectares of degraded pastureland and enhancing 5 million hectares of integrated cropland – livestock. Brazil will formulate new standards for clean technology, build low carbon infrastructure and improve public transport in urban areas.

Mexico

Mexico plans to bring change in mainly 5 areas; energy, industrial process and product use, agriculture, waste, land use. The INDC report has divided its committed to energy sector in two components i.e. Fuel combustion and fugitive emission from fuels. It intends to reduce consumption and increase efficiency of the fuel in energy industries, manufacturing industries, transport and construction, and aims to curb fugitive emissions in Solid fuels such as wood, Oil and natural gas. Mexico will incorporate any global market based mechanism ruled out in CoP 21 to achieve rapid and cost efficient mitigation.

The Mexican government proposes to change industrial processes and product use in a greener direction in mainly mineral industry, chemical and Iron steel industry, electronic industry. The government strategizes to bring new agriculture policies focusing on rice cultivation, agricultural soils, field burning of agricultural residues, Manure management. It also plans to upgrade its solid waste disposal system by incorporating biological methods. Afforestation, reforestation,

forest management, cropland management, grazing land management are the focus on the new land use policy.

5. ANALYSIS AND CONCLUSION

China, India, Mexico and Brazil have taken a bold step by intending to reduce GHG emissions by a large amount. China, the most developed among the developing countries, has committed to reduce emissions by 65%, followed by Brazil 37%, India 33-35% and Mexico 25%. However, Brazil and Mexico have conditionally committed to reduce up to 43% and 40% respectively with international support.

All the four countries have highlighted their adaptation strategies in the areas where each country is highly vulnerable towards. India being an agrarian economy has focused mainly in agriculture, China will increase its forest cover and education of low carbon way of living, Brazil was recognized to address social problems (population, ecosystem, infrastructure and production systems) through ecosystem services. Mexico, geographically situated between two oceans has the most detailed report on adaptation strategies. Their strategy is comprehensive by balancing focus towards fighting poverty, saving ecosystem and sustainable infrastructure.

Most of these targets are unconditional and will be achieved by their own funds. All countries state that international cooperation will be needed in technology transfer, capacity building and financing the resource gap. Fuel guzzling countries such as China, India will tax coal and energy/resource products and create green credit mechanism for encouraging renewable energy and enhanced energy efficiency. Further, India will remove subsidies on fossil fuels such petrol, diesel and LPG. The Latin American countries, Brazil and Mexico, have not clearly specified their financing strategies because of their unconditional nature. However, Mexico has highlighted

the five areas in which it needs technology transfer from developed nations in capacity building.

The policies of the four countries have been or will be formulated as per their national needs. India will look forward to increase the share of renewable energy to 40% by 2022 by focusing on solar and wind energy, and enhance energy efficiency through national mission for enhanced energy efficiency (NMEEE). To achieve such a majestic target of 65%, China will build on the existing policies, formulate new enhanced policies in sustainable production, consumption, science and technology, economic policy and international cooperation. Brazil will strengthen its use of Bio-fuels, focus on land use change and low carbon energy supply. Whereas, Mexico has highlighted 5 areas i.e. energy, industrial process and product use, agriculture, waste, land use to focus on.

In conclusion, the intended climate change plans of the developing countries are positive and detailed. Moreover, the agreement is said to be legally binding, but sanctions on failure to comply are not available on public domain. However, the conference's success will only be determined by time.

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