



India's Climate Action Pledges at Paris CoP-21 (NDC) and Glasgow CoP-26

What are these, how far have we come, and what needs to improve?

A Briefing Paper

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“IPCC report: ‘now or never’ if world is to stave off climate disaster.

Greenhouse gas emissions must peak by 2025 (and reduce by over 45% by 2030), say climate scientists in what is in effect their final warning”. The Guardian quoting IPCC AR-6, WG-III report; released in April 2022¹.

“System Transformations to Limit Global Warming : *Global GHG emissions are projected to peak between 2020 and at the latest before 2025 in global modelled pathways that limit warming to 1.5°C (>50%) with no or limited overshoot and in those that limit warming to 2°C (>67%) and assume immediate action. In both types of modelled pathways, rapid and deep GHG emissions reductions follow throughout 2030, 2040 and 2050 (high confidence). Without a strengthening of policies beyond those that are implemented by the end of 2020, GHG emissions are projected to rise beyond 2025, leading to a median global warming of 3.2 [2.2 to 3.5] °C by 2100 (38,39, medium confidence). (Table SPM.2, Figure SPM.4, Figure SPM.5) {3.3, 3.4}”; IPCC Assessment Report-6, Working Group-III².*

“World’s leading climate scientists issued an ear-splitting wake-up call to the world that **climate change is running faster than we are – and we are running out of time.** We see the consequences all around us – more extreme weather, rising sea levels, diminishing Arctic sea ice. The scientists paint the most vivid picture we have ever had between a temperature rise of 1.5 degrees versus 2 degrees. A half of degree of warming makes a world of difference. More heat waves for tens of millions of people. Far greater species loss. Increased water scarcity in some of the world’s most unstable regions. A ten-fold increase in Arctic ice-free summers. And a total wipe-out of the world’s coral reefs...We must rise to the challenge of climate action and do what science demands before it is too late.”

António Guterres, UN Secretary General, responding to the IPCC’s Special report: Global warming of 1.5 C, in 2018.

¹ <https://www.theguardian.com/environment/2022/apr/04/ipcc-report-now-or-never-if-world-stave-off-climate-disaster>

² <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/>

Introduction

The Intergovernmental Panel on Climate Change, or IPCC³, is not a completely independent and radical scientific body. It is a body constituted by the United Nations, consisting of large number of scientists from many specialities, of environmental economists and other experts, taken from over 130 countries. Every 6-7 odd years, IPCC does a comprehensive assessment of thousands of peer reviewed papers published in credible scientific literature, and after thorough evaluation, comes out with a set of three periodic Assessment Reports – on Physical Science Basis of Climate Change and the current status, The Impacts, Vulnerabilities and Adaptation, and finally on Mitigation of Climate Change. These three are then synthesised in to a synthesis report. All of these have to pass through the member governments’ scrutiny⁴ before being released in the public domain. When the reports of this expanse, rigour and scrutiny indicate that “It’s now or never”, with an urgent timeline of drastic action of four years and nine years, the time has arrived for very serious consideration and action.



‘Climate Change’ is now widely recognised as an emerging crisis and one of “the defining challenges of the 21st century”⁵, along with massive inequality, declining democracy and a ravenously extractive economic pathway. Almost all of these are interconnected. Many of the affected communities and scientists are now redefining this as a Climate Crisis (and not a “change”). Facing such a challenge, and with a huge number of economically, socially and environmentally vulnerable population, it was expected that the Government of India (GOI) will act with some

³ https://www.ipcc.ch/site/assets/uploads/2021/07/AR6_FS_What_is_IPCC.pdf

“The Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. The IPCC was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). The assessments are policy-relevant but not policy prescriptive: they may present projections of future climate change based on different scenarios and the risks that climate change poses and discuss the implications of response options, but they do not tell policymakers what actions to take.”

⁴ <https://www.ipcc.ch/2019/01/25/2019-refinement-government-review/>

⁵ http://www.wrf.it/wp-content/uploads/2017/06/300mldalberipresentazione201703_en.pdf.

“Climate change is a defining challenge of the 21st century. Its causes are deeply embedded in the ways we produce and use energy, grow food, manage landscapes and consume more than we need. Its effects have the potential to impact every region of the Earth, every ecosystem, and many aspects of human endeavour. Its solutions require a bold commitment to our common future”.

seriousness, both in moving towards reducing India's contribution to emission of greenhouse gases, and more importantly, in developing adaptation practices and building resilience of its multitude of vulnerable communities. Many of the economic and industrial activities that are climate threats – like large scale coal burning, are also the ones that threaten the health and well being of nature-dependent communities and also populations in general. A case in point is the estimated premature death figures of over 1.67 million (16.7 lakhs) per year in India in 2019⁶ from exposure to high levels of air pollution, with coal and oil burning (which also are major contributors to climate threatening CO₂ emissions) contributing a major part towards pollution.

The GOI's 'plans for climate change' have two different tracks. In the international arena, at the UNFCCC (UN Framework Convention on Climate Change, founded in 1992 Rio Earth Summit), India submitted its Nationally Determined Contribution or NDC⁷, in October 2015, just before the Paris Climate Summit. The GOI came up with – first a National Action Plan on Climate Change or NAPCC in June 2008, followed by eight National Climate Missions as part of NAPCC⁸. Some of the National Climate Missions – particularly the National Mission for Green India, National Mission for Enhanced Energy Efficiency and the National Solar Mission - have been closely tied to what GOI pledged at the international level through its NDC. The State governments were directed to come up with their own State Action Plans on Climate Change or SAPCCs⁹, and the first version of these were completed by around 2014-15¹⁰. At the present time, most States are doing their first revision / second version of the SAPCCs¹¹.

In this paper, the author is limiting his analysis to GOI's NDC and their compliance /achievements only (note: the original documents by countries were called "Intended Nationally Determined Contributions" or INDCs, but afterwards, when countries including India ratified its joining the Paris Agreement – these were changed to NDCs¹². This was submitted just before the Paris Climate Conference in 2015 began. Its associated announcements were done by the Indian Prime Minister in Paris, and the subsequent modifications of some NDC targets announced – again by the Prime Minister¹³ in the 2021 Glasgow climate conference. The other areas – the National Climate Missions (some of which are tied to the NDC, some others are adaptation and knowledge related), the SAPCCs etc. deserve a completely separate treatment.

The Context of Global Climate Governance

The GOI submitted its Intended Nationally Determined Contribution to the UNFCCC, on October 02, 2015, weeks before the Paris Climate summit began in November. This was ratified in 2016. It is noteworthy that though this was called 'Nationally Determined Contribution', there were no large scale consultations, or even information sharing involving any significant part of the 'Nation'. These plans were largely made by government bureaucrats, with inputs from 'line departments', and with some chosen consultants and NGOs.

It is also important to understand the fundamental changes in the global climate change governance systems, from till 2009 (when the highly publicized Copenhagen Climate Conference happened) to

⁶[https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(20\)30298-9/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30298-9/fulltext)

⁷ <https://moef.gov.in/wp-content/uploads/2018/04/revised-PPT-Press-Conference-INDC-v5.pdf>

⁸ <https://dst.gov.in/climate-change-programme>

⁹ <https://www.opml.co.uk/files/Publications/corporate-publications/briefing-notes/id-state-action-plan-climate-india.pdf?noredirect=1>

¹⁰ <https://www.thehindu.com/news/national/28-states-prepare-climate-action-plans/article6324142.ece>

¹¹ <https://www.downtoearth.org.in/blog/climate-change/state-action-plans-on-climate-change-need-upscaling-and-capacity-enhancement-66796>, <https://www.downtoearth.org.in/blog/climate-change/state-action-plans-on-climate-change->

¹² <https://www.wri.org/insights/insider-whats-changing-countries-turn-indcs-ndcs-5-early-insights#:~:text=According%20to%20the%20global%20climate,unless%20a%20country%20decides%20otherwise.>

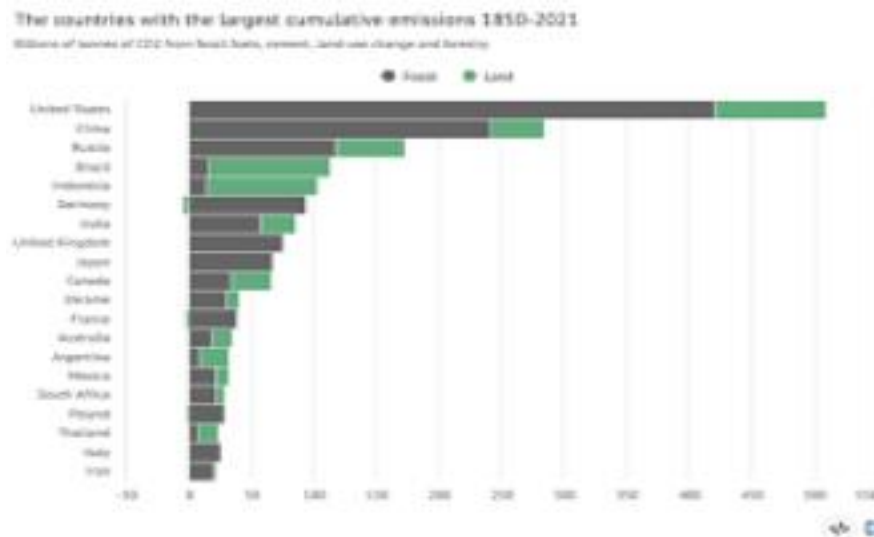
According to the global climate pact, a country's INDC is converted to a Nationally Determined Contribution (NDC) when it formally joins the Paris Agreement by submitting an instrument of ratification, acceptance, approval or accession, unless a country decides otherwise

¹³ <https://www.mea.gov.in/Speeches>

[Statements.htm?dtl/34466/National+Statement+by+Prime+Minister+Shri+Narendra+Modi+at+COP26+Summit+in+Glasgow](https://www.mea.gov.in/Speeches/Statements.htm?dtl/34466/National+Statement+by+Prime+Minister+Shri+Narendra+Modi+at+COP26+Summit+in+Glasgow)

2015 Climate Summit in Paris. One key change was in the process of member countries commitments to do their climate actions based on what their cumulative contributions are in creating the massive Atmospheric and Oceanic Green House Gas (GHG) build-up. Countries were thus earlier classified in to industrialised countries who majorly contributed in creating the climate change crisis, or Annex-I countries, and those non/least industrialised countries who had little role in creating this, or Non-Annex countries¹⁴.

Figure 1. Source Carbon Brief (*F1)



Thus, though all countries have contributed to some degree, this contribution is Common But (highly) Differentiated, or the accepted concept of CBDR. It was also accepted that Industrialised / developed countries have built up both their economic and technological (and social++) capacities through massive use of fossil fuel energy, whereas the poorer developing / less-industrialised countries have far less financial and technological capacities, leading to the concept of “Respective Capacities” or RC. This CBDR-RC was a generally accepted principle till around 2009-2010 (though without any penalty for not delivering on your commitments). In Paris, this was subtly changed to the process of countries giving self-chosen pledges of whatever climate action they choose to do (and up-gradation of pledges every five years), irrespective of their contributions to the historic GHG build-up which is causing the climate crisis, and then verifying whether they are delivering on these pledges. One of the main reasons most country governments readily agreed to the Paris Agreement was the voluntary nature of choosing action, which unfortunately is not good enough for addressing the crisis.

Thus, the key Climate Justice principle of *Common But Differentiated Responsibilities* (and Respective Capacities), or CBDR-RC was effectively discarded, not explicitly, but in effect¹⁵. After this, even the language of CBDR-RC was subtly changed to “Shared common responsibility” by the time of the Glasgow CoP-26, which essentially meant that all countries and societies are responsible

¹⁴ <https://www.nature.com/articles/s41599-019-0298-6>

“To be effective and secure participation, a global climate change agreement needs to be perceived as fair by the countries involved in it. The Paris Agreement approached differentiation of countries’ responsibilities to address climate change by departing from the rigid distinction between industrialised and developing countries through the inclusion of ‘subtle differentiation’ of specific subsets of countries (e.g., Least Developed Countries) for certain substantive issues (e.g., climate finance) and/or for specific procedures (e.g., timelines and reporting). In this article, we analyse whether the self-differentiation countries followed when formulating their own climate plans, or nationally determined contributions (NDCs), is consistent with the Paris Agreement’s subtle differentiation. We find that there is consistency for mitigation and adaptation, but not for support (climate finance, technology transfer and capacity building). As NDCs are the main instrument for achieving the Paris Agreement’s long-term goals, this inconsistency needs to be addressed to allow subsequent rounds of NDCs to be more ambitious.”

¹⁵ <https://digitalcommons.law.uw.edu/cgi/viewcontent.cgi?article=1133&context=wjelp> Washington Journal of Environmental Law & Policy Volume 11 Issue 3 5-18-2021 Principle of CBDR-RC: Its Interpretation and Implementation through NDCs in the Context of Sustainable Development

to address the climate crisis, without key differentiation of who created this and who suffers the most, and who has the capacity to invest to address this crisis. This also meant that even though the USA (historically largest GHG emitter), China (second largest cumulative emitter now, country wise) and the EU (second largest as a block) are responsible¹⁶, even extremely poor countries like Chad or Lesotho or DRC, with almost ‘non-existent’ contributions to historic GHG emissions, are also responsible to address the climate change crisis. Same goes for India, though its cumulative or historical emission is much lower (F1 above) than even countries like Germany, France, UK, South Korea etc, each of which have less than one-twentieth its population. It was also agreed in Paris in 2015, without changing the arbitrary figure of USD 100 billion per year determined in Copenhagen in 2009, that this amount of climate finance will be annually given by Annex-I countries to the poorer Non-Annex countries, starting 2020. Unfortunately, even this meagre amount of climate finance (for context, the global economy was over USD 85 trillion in 2019, meaning this USD 100 billion figure is less than 0.0012% of global GDP) has not materialized¹⁷. Countries here refer to governments of the countries, as they are the “Parties to the Convention” in UNFCCC. People in general, civil society etc. have no or very little direct access, unless they have large influence on their governments (unlike multi-lateral and other large banks & financial institutions, large business and corporate interests etc., who have much better access to both the governments and some UN mechanisms), though UN-accredited civil society organizations, farmers organizations, women’s groups, youth groups etc. are recognised as Non-State actors and are allowed to participate in some UNFCCC proceedings as “Observers”.

Indian Context



Before going into the individual ‘pledges’ that India gave, let us first see the context and India’s position in the world now, in terms of the relevant factors –

- India is the 3rd largest contemporary Carbon (actually CO₂) emitter now, by country figures (after China and USA), and fourth largest if European Union is taken as one unit. India’s absolute CO₂ emissions were approximately 2.5 Gtons (250 crore tons) in 2018 and 2019¹⁸, which was about 7.2% of global emissions. This translates to about 1.82 tons CO₂ per person

¹⁶ <https://www.theguardian.com/environment/2011/apr/21/countries-responsible-climate-change>

¹⁷ <https://www.nature.com/articles/d41586-021-02846-3>

¹⁸ <https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=IN>

per year, a low figure compared to the world average, and still marginally within the ‘Earth’s permissible limits’.

- Considering all Green-House Gas (GHG) emissions (including Methane CH₄, Nitrous Oxide N₂O, CFCs, from agriculture, forestry, land use change, solid & liquid waste etc), India’s CO₂e (Carbon dioxide equivalent) emissions came close to about 3.0 Gtons in 2019, or about 2.20 Tons CO₂e/person (considering India’s population was about 136.7 Crores or 1.367 billion in 2019). This is less than half the global average per person emissions, which crossed 4.8 Tons/person in the year 2019. In spite of this “low” per capita figure, India’s emissions are of concern as this has risen about 335% from 1990 to 2019¹⁹, and considering that India is soon (in 2023) to become the country with the largest population, overtaking China.

{Explanatory note: A working explanation of CO₂e, or Carbon Dioxide Equivalent-warming caused by one mole (or any fixed volume) of Carbon Dioxide CO₂ is considered One CO₂e. Another potent GHG, Methane is over 85 times as powerful in warming the atmosphere in the time period of 10-12 years, for the same amount, so its CO₂e would be around 85. Similarly Nitrous Oxide N₂O has a CO₂e of around 300, while some of the CFCs and HCFCs (Chloro Fluoro Carbons and Hydro Chloro Fluoro Carbons) have CO₂e of thousands. A much smaller amount of these highly potent GHGs can warm up the atmosphere more than a larger amount of CO₂.}

- It is to be noted that these comparatively low per capita emissions by India – both of CO₂ and CO₂e figures, are primarily due to the large poor populations of the country, with very little emissions, who do not have enough financial resources to consume the products and services that have high carbon intensity. India’s upper-middle and upper classes consume at much higher rates and contribute to emissions at nearly comparable global average rates²⁰.
- The year 2020 saw a global reduction of CO₂ emission of about 7% (some later estimates – by International Energy Agency²¹ and others - have revised this down to about 5.8%), due to the world-wide lockdowns and consequent reductions in economic activities²². India also saw a comparable reduction. Though the CO₂e emissions did not drop as significantly, as agricultural and land-use change related emissions remained relatively stable. Also, the household consumptions in the better off societies and countries did not drop, but has even increased in some cases. This also has important learning for future Mitigation (emissions reduction) strategies.
- India’s historical (cumulative) total CO₂ and CO₂e emissions per capita are even much lower as percentage of global figures²³, as the majority of the increase has taken place in the last 25-30 years of comparatively rapid industrialisation and even faster rise of middle and upper class consumption of Carbon-intensive goods and services.
- Over the last 5-6 years, India’s percentage increase in CO₂ emissions was the highest amongst major economies (though China increased more in absolute term, because of its much larger base)²⁴.

¹⁹ [https://www.statista.com/statistics/606019/co2-emissions-india/#:~:text=Per%20capita%20carbon%20dioxide%20\(CO2,1.87%20metric%20ton](https://www.statista.com/statistics/606019/co2-emissions-india/#:~:text=Per%20capita%20carbon%20dioxide%20(CO2,1.87%20metric%20ton)

²⁰ <https://scroll.in/article/984472/in-india-the-rich-cause-seven-times-more-emissions-than-the-poor>
“In India, the rich cause seven times more emissions than the poor;”

²¹ <https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020>

²² <https://www.nature.com/articles/s41558-020-0797-x>

²³ <https://ourworldindata.org/contributed-most-global-co2>

²⁴ <https://www.climatecard.org/2020/12/india-has-seen-greenhouse-gas-emissions-increase-by-a-staggering-335-since-1990/>

- India is also the 3rd largest energy consumer by country position, with about 5.8% of global primary energy consumption²⁵.

Total energy consumption in Mtoe, 2018-19 (Figures from ENERDATA)²⁶

- China 3,652
- United States 2,123
- India 927
- Russia 811
- Japan 400
- Brazil 308
- South Korea 298
- Canada 289

India's per capita commercial primary energy consumption in 2018 was around 680 KgOe, while per capita electricity consumption was around 1150 Kwhrs /person/year (again, with huge internal disparities between States, rich and poor etc, in both).

- Out of India's total primary commercial energy consumption of over 920 Mtoe ²⁷ (million tons oil equivalent), about 33% or 1/3rd is imported, mostly as petroleum, natural gas and low ash coal. This has huge financial and policy (both economic and foreign relations) implications, including the necessity for huge foreign exchange earnings for these imports.
- India has one of the largest Renewable Energy programs in the world (Statista.com²⁸), with 'targets' being periodically upgraded to quite ambitious levels. Also, India ranks fourth or fifth in both total Solar and Wind power capacity installed (the 3rd to 5th positions keep varying).
- India now is also the third largest electricity producer and consumer in the world, by country figures²⁹. In 2019, the gross electricity generation in India was about 1600 TWHrs (Tera Watt Hours, or 1,600,000,000,000,000 watt-hours, or 1600 billion KWHrs or Units), out of which utilities generated about 1385 TWHrs. For comparison, the world figures were about 23,398 TWHrs in 2019, India's share being about 6.84% of world total, while India's population is about 17.5% of the global total. The per capita gross electricity consumption was about 1208 KWHrs/person/yr in India, with net consumption being around 1100 KWHrs. Again, this is much lower than the global average figure of about 3000 KWHrs /person/yr.
- By most external assessments, India is "doing well" – though not enough – in its climate actions, given India is a lower-middle income country with very large poor population. According to the 2020 report of the annual assessment brought out by the non-profit 'German Watch'³⁰ called Climate Change Performance Index (CCPI), India is one of the top 10 performers, along with European Union and United Kingdom (both have since taken regressive steps, particularly, in the wake of the Russian invasion of Ukraine and consequent disruptions in Russian Gas supply to EU countries).

²⁵ <https://indbiz.gov.in/india-becomes-third-largest-electricity-producer/#:~:text=India%20has%20come%20up%20as,Ministry%20of%20Commerce>

²⁶ World Energy Consumption Statistics | Enerdata

²⁷ https://www.enerdata.net/publications/world-energy-statistics-supply-and-demand.html?gclid=Cj0KCQjwy5maBhDdARIsAMxrkw0HO1gjjXgQqvDtRIOEiwWN-LVAulv6bQ-EKYmCCC2MxAj4TrilJckaAm8GEALw_wcB

²⁸ <https://www.statista.com/statistics/267233/renewable-energy-capacity-worldwide-by-country/>

²⁹ <https://indbiz.gov.in/india-becomes-third-largest-electricity-producer/#:~:text=India%20has%20come%20up%20as,Ministry%20of%20Commerce%20h>

³⁰ CCPI: India retains top 10 slot in climate performance index <https://economictimes.indiatimes.com › News › India>

India's NDC

It is quite strange that India's NDC, the climate change tackling plan submitted to UNFCCC, explicitly states that coal is its main energy source now, and will remain so in the foreseeable future³¹. As of now (Power ministry statistics dated 31 May 2022³², about 68% of India's electricity generation and about 55% of its Total commercial primary energy comes from coal³³, with India having about 210,000 MW of installed coal power capacity, out of a total of 402,817 MW electricity (May 2022)) from all sources. This is despite the fact that coal is by far the most emission intensive fossil fuel. Lower grades of coal and lignite, which India use in plenty in its power plants, do cause even more pollutions per unit of energy produced than anthracite and bituminous coal. And coal is not only carbon intensive, it's also the largest source of lethal air pollution that is already adversely affecting a very large percentage of Indian population. By the estimates from the Global Burden of Diseases report, about 16.7 lakh people die a premature death in India every year, due to air pollution. And air pollution, where coal burning is a major contributor, also cuts an average Indian's life expectancy by about 5.2 years, as per a recent joint study led by University of Chicago scientists, as earlier Lancet study has also shown³⁴. Out of the major emitters, India is the only one which has not pledged any upper limit of emissions, neither has it given any timeline by which time its emissions will peak and then fall, rather regrettably, both environmentally and as a political strategy.

NITI Aayog

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

Nationally Determined Contributions - Transport Initiative for Asia (NDC-TIA) India Component
Under International Climate Initiative

Kick-off Event

DATE
Thursday, 27 August 2020

TIME
14:30 - 16:15 CET / 18:00 - 19:45 Hours IST

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

icct International Centre for Transport and Environment

International Transport Forum

WORLD RESOURCES INSTITUTE

Agora Verkehrswende

SLOCAT Partnership on Sustainable Low Carbon Transport

REN21

In its NDC (submitted first in October 2015, upgraded in November 2021), **India has basically pledged 3 quantified targets** and a specific target for renewable power capacity also –

- By the year 2030, the carbon emission intensity of India's economy (kg of CO₂ emitted, say for every Rs.1000 GDP) will decrease by 33-35%, compared to a 2005 baseline. Note that all actions are proposed in the time frame 2016—2030, and 2015 being the year when these pledges were submitted. The timeline 2016--2030 is also the SDGs (Sustainable Development Goals, the 17 goals and hundred plus targets adopted by the UN in September

³¹ <https://www.bbc.com/news/world-asia-india-58991207>

³² <https://coal.nic.in/en/major-statistics/coal-indian-energy-choice>

³³ <https://powermin.gov.in/en/content/power-sector-glance-all-india>

³⁴ <https://www.bbc.com/news/world-asia-india-61489488>

2015) period, and the IPCC projection of the year by which a roughly 50% reduction is needed in global GHG emissions for climate stabilisation. In the Glasgow CoP-26 in November 2021, the Prime Minister upgraded this Emissions Intensity reduction target to 45% below 2005 levels, by 2030³⁵.

- By 2030, non-fossil fuel sources (including nuclear fission and big dam based hydro power, not renewables alone) will account for at least 40% of India's Installed Power capacity. This is said to be with low cost technology transfer and international Finance. Again, in Glasgow CoP26, this pledge was upgraded to 50% of the installed power capacity, along with 500 GW of non-fossil / renewable energy (not defined clearly), presumably by 2030.
- Also pledged in Paris - India will sequester an additional 2.5--3.0 Gtons (250-300 crore metric tons) of CO₂, through afforestation and reforestation / forest densification, between 2016 and 2030. The achievement will be by increasing carbon stocks (the amount of carbon held in biomass) in both forests and non-forest 'tree-cover'. In the Glasgow CoP26, India neither mentioned this at all nor that will it follow its 2015 pledges³⁶.

***Note 1:** It is quite strange that even if India announced its target to increase its forest (and green) cover significantly, to sequester an additional 2500—3000 million tons of CO₂ by the year 2030, when the Glasgow CoP26 proposed that by 2030, global deforestation be completely stopped, India did not support or accept this³⁷. About one hundred governments did adopt this pledge and the developed countries pledged to fund this effort by developing countries with a 'promise' of about \$19 billion funding to these developing countries. India's excuse was that this deal refers to Trade in Forest Products, and that trade should not come in UNFCCC CoP negotiations. One might wonder if the real reason is concealed in the large scale Timber Imports – both legal and illegal - by India from the heavily forested South East Asian countries like Malaysia and Indonesia³⁸.

Note 2: In Glasgow November 2021, the Indian PM announced that India will achieve Net-Zero emissions target by the year 2070. He also said India is offering "Pancha Amrit tatwa" (five divine elixirs) to the world, in terms of its "climate actions". These "Panchamrit", or Five agendas (some are recycled from 2015) presented as India's National Statement, cover³⁹–

- a. Raise non-fossil fuel source based power /electricity capacity to 500 GW by 2030, upgrading its Paris pledge.
- b. 50% of India's energy needs will be met by renewable energy. Please note here, that this confusion between "energy needs", "power/ electricity needs" and "installed power capacity" – which are three very different things, pervades India's confused targets and announcements.
- c. India will reduce its "projected CO₂ emission" by 2030, by one billion ton. This is a new figure introduced after the Paris pledges.
- d. The carbon intensity of the Indian economy will be reduced 45% below its 2005 level, by 2030. This is basically an energy efficiency target.
- e. India will reach 'Net-zero emission' target by the year 2070.

Note 3: 'Net-Zero emissions'⁴⁰ mean that while a country will not reduce its CO₂ emissions to zero (meaning it will continue to burn coal, oil or gas), and continue to emit CO₂, it will simultaneously 'sequester' or absorb the total amount of emissions by some other means – biological or technological. There are a host of yet unproven technological methods proposed, and these are collectively called CCS (Carbon Capture and Storage, or CCUS Carbon Capture Utilization and Storage). The one

³⁵ <https://www.thehindu.com/opinion/editorial/climate-pledge-on-cop26-summit-in-glasgow/article37312195.ece>

³⁶ <https://www.theweek.in/news/world/2021/11/03/india-stays-off-uk-led-deforestation-declaration-at-cop26-summit.html>

³⁷ <https://www.cbsnews.com/news/deforestation-end-pledge-2030-cop26/>

³⁸ <https://www.forest-trends.org/publications/indias-imports-of-illegally-harvested-wood/>

³⁹ <https://www.hindustantimes.com/india-news/pm-modi-delivers-india-panchamrit-gift-at-cop26-to-fight-climate-change-five-commitments-in-de>

⁴⁰ <https://www.climatecouncil.org.au/resources/what-does-net-zero-emissions-mean/>

permanent sequestration plant (CCS) achieved is in Iceland⁴¹, and depends on very specific Geology /Geo-morphology and very cheap power source, which Iceland provides with Geothermal power. Even with this suitable conditions and cheap electricity to run the energy intensive process, the cost per ton of CO2 sequestered was coming to over \$200, a very high figure which is not in sync with market conditions. These are not suited to most places in the world. Most developed countries and a few large developing countries have pledged to reach 'Net-Zero emissions' by 2050, while China announced 2060 as its target year.

- India's Renewable electricity target (during original NDC submission in October 2015) was pegged at 175,000 MW of installed capacity by 2022, with 100,000 MW Solar (with 40% of that coming from rooftop / distributed sources), 60,000 MW Wind, and rest from small hydro, biomass and "waste-to-energy" plants. In September 2019, Indian PM announced a sharply upgraded target of 450,000 MW of Renewable installed capacity - without clearly mentioning a date, but widely interpreted to be compliant with 2030 PA / SDG deadline. In Glasgow, this was again modified to 500 GW by the year 2030⁴².

How far has India come on its NDC / Paris Climate Pledges?

In the last six years after submitting its NDC to UNFCCC (2016-2021), India is very much on course on some of its pledges, while some are clearly off-course --

- **Decrease in emission's intensity** - Indian economy is already about 25-28% less emission intensive now, in comparison to the 2005 baseline. This shows that achieving 35% reduction over 2005 baseline will likely be achieved much before 2030, the Paris Pledge deadline. In fact, present projections show a roughly 45-50% reduction of emission' intensity by 2030, compared to 2005 baseline, in line with the enhanced targets announced at Glasgow. One has to understand that the increase in energy efficiency (and consequent reduction in emissions intensity) is a normal technological and economic process, and can be sharply accelerated with directed technological and policy initiatives.



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- **Non-fossil fuel electricity capacity installed** - India at present (May 2022) has about 113,225 MW of installed 'new' (excluding hydropower) renewable power capacity, with about 46,700 MW of hydropower capacity and little less than 7000 MW of nuclear power capacity installed. These total about 166,730 MW of 'non-fossil' power capacity, out of a total installed capacity (all sources) of about 402,817 MW (*18 F-2), giving a figure of about 41.39 % of its installed electricity capacity from non-fossil sources. Thus, on this pledge, India has already crossed this specific Paris climate pledge, and its well on its way towards the enhanced Glasgow targets of before 2030. Though one needs to recollect that when India announced its NDC / Paris pledges, big hydropower (over 25 MW installed capacity) was not categorized as Renewable. Though India's Pledge was for "at least 40% capacity from non-fossil energy sources", many interpreted this as an effort by India to achieve 40% renewable capacity. India's 'achievement' in this category is thus, right by the figures, but a little trick of re-categorizing 45,000 MW of then existing capacity, literally overnight. Considering just the new renewables, like Solar, wind, biomass-electricity, small hydro & WTE (many of these have other serious issues), the present installed capacity is about 28% of the total. In 2019, the Indian government re-categorized large hydro power as 'renewable' energy source (there is strong reservations on this by many groups, on valid grounds). This has in 'one pen

⁴¹ <https://en.unesco.org/news/carbon-capture-and-storage-plant-becomes-operational-iceland>

⁴² <https://indianexpress.com/article/explained/explained-pms-climate-promises-and-how-far-india-is-on-track-to-meet-them-7611943/>

stroke', increased the RE electricity capacity by about 45,000 MW. Meanwhile, many countries do count large hydropower as renewable energy, with all its attendant issues.

- If we carefully study the renewable capacity targets, the 2022 target was 100,000 MW Solar power installed, with 40,000 MW from distributed /rooftop and 60,000 MW from utility scale power plants. One has to understand the 'Achilles Heel' of the Solar power industry, i.e., it requires large amounts of land, as the incident solar radiation (insolation) is of low intensity, and also intermittent. Thus, large utility scale power plants need large amounts of land, and this is giving rise to many land conflicts with farmers, pastoralists, and villagers etc. who are again losing out, this time in the name of 'clean energy'. This needs to be reversed. From this perspective, a large share of distributed / rooftop capacity is much more desirable, also to distribute the economic gains more fairly.
- Regrettably, the actual progress on some of these fronts are much less than desired. According to data from India's ministry of New & Renewable Energy, the May 2022 capacity installed figures are – Solar PV at 56,951 MW (compared to a target of 100,000MW (*18 F-2)), with utility scale at about 50,000+ MW and rooftop accounting for less than 7000 MW. It is now clear that India is not going to achieve its 2015 Paris Pledge of 100,000 MW of installed solar power capacity by 2022. More importantly, the distributed solar is faltering badly, and instead of 40,000 MW by 2022, we are headed towards a below 10,000 MW reality. In the overall Solar target for 2022 – even if another expected 10,000 MW of solar PV power comes online by end of December 2022, there will be an under-achievement of 33,000 MW, or 33%- a fairly large shortfall. The much bigger failure is on the roof-top target, which was supposed to give power independence to farmers, individual families and communities in general.
- On the wind power front also, the developments have slowed down considerably. After being the front runner among renewables in India (also in many European countries) in the first one and half decades of this century, new power capacity additions have considerably slowed down. The present (May 2022) installed capacity of wind power in India stands at 40,706 MW (*18 F-2), a far cry from the 60,000 MW target by end of 2022, with little chance of catching up with the target, considering that wind power is growing much slower than solar.
- From IRENA (International Renewable Energy Agency) figures, India has added about 15,000 MW of RE capacity in 2017, about 13,000 MW in 2018, about 10,000 MW in 2019 and a meagre 7,000+ MW in 2020. Instead of speeding up, this is actually a slowing down (even before the COVID pandemic). And we are already far short of the NDC pledges.



- **The ‘additional CO2 sequestration’ pledge** has not gone very far, as this involves large amounts of both forest and some non-forest lands. By GOI estimates, India now has about 21.7% of its land area of 328.9 million hectares under "forests", with moderately dense forests and degraded forests both accounting for a little over 9% each. Dense forests cover the rest of roughly 2.7% of land declared under forest department.

Out of the 71.3 million hectares of 'forest department' land, the estimates shows that close to 32-35 million hectares (about 320,000 to 350,000 sq. kms, about half of all forest department land, or about 10% of India's total land area) would be needed for achieving the CO2 sequestration pledge. Almost out of realistic targets or range. Recently, India's Ministry of Environment, Forests and Climate Change (MoEF&CC) has come up with another trick, by defining a new category of "total forest and tree cover" in the country, and that is about 24.56% of the country's land area, or about 80.73 million hectares. One has to remind oneself that this size of land is about half the size of all the cultivated area in India, and large parts of this land already is utilized by people, economically (grazing is one of the biggest uses, NTFP collection is another), socially and culturally. As per the State of the Forest report 2019, where these figures were mentioned, the total increased from 21.54% to 24.56%, though it is not very clear if that older figure of 21.54% was forest Cover or "forest and tree cover". It seems that the government believes more in accounting tricks by declaring big hydro as 'renewable' than in real ground level climate actions, which are harder.

Accordingly, India has increased about 518,800 hectares of forest & tree cover despite continued deforestations, which is the irony. Out of these, the claimed increase in forest cover is 397,600 hectares and in tree cover, of about 121,200 hectares. How much CO2 sequestration capacity this has added, even if true, is difficult to assess, without knowing the details of types of trees, planting details, survival rates, post-planting care plans and a host of other factors. Various research has shown that, in a tropical climate like India's south and central parts, a mature but healthy growing forest can sequester/ absorb a max of about 2.5-5.0 tons of CO2 per hectare per year, depending upon prevailing weather conditions. With that, the claimed increase of 518,000 hectares of "forests and tree cover" will lead to a max of about 1.3 to 2.6 million tons of CO2/year (according to rate estimates by Science Daily). This is less than 0.1% of the targeted "additional CO2 sequestration" as stated in the NDC. Further, one has to understand that trees, once planted and survived, take 8-10 years to start sequestering those estimated amounts of CO2 per year, and not immediately after planting. But even this claim is all the more difficult to believe with the stark realities of massive forest area diversion for 'development projects'. As per a statement in the Lok Sabha by the MoS of MoEF&CC, in the five years of 2015-2019, the GOI has given permission to cut down about 11 million (10,975,844) trees. And this is just the official permission to cut. Cutting down mature trees that not only sequesters carbon, but holds and gives water, harbour rich biodiversity, produce oxygen and other valuables and control local climate, while planting saplings that might or might not survive, is clearly not a climate friendly action.

- Large tracts of the 'degraded and moderately dense' forest lands are also either home to large no of 'Adivasis' ('Indigenous Peoples) and/or their source of livelihoods. Planting 'high carbon sequestering' trees in large tracts of such lands - often denying traditional uses, are bound to lead to large scale conflicts, some of which have already started. The GOI's recent attempts to stall the Forest Rights Act implementation, to throw out over 1.8 million forest dwelling families are likely indications of this developing conflict. A cardinal principle of climate justice is that human rights in all its forms must be fully protected, when 'climate actions' are planned and implemented.

Is India's NDC Compliant with a 1.5 C Target?

As per available figures (from Climate Action Tracker and other sources), India's Paris pledges are not compliant to a 1.5C pathway on its 'fair share', but still marginally compliant with a 2C pathway. As per these estimates, India need to quickly reduce the rate of growth of its GHG emissions, and by the year 2030, reach no more than 4.5 Gton CO₂e (from the present about 3.0 Gton CO₂e, which increased from about 2.87 Gton in 2018). This then need to go down to 3.2 Gton CO₂e by 2050, before heading to Net-Zero in next two decades. As per current projections (NDC derived), India's total 2030 emissions are headed towards a much higher 6.0 to 6.3 Gtons (1Gton is a 100 Crore metric tons), excluding emissions from Land Use changes. This is not a very encouraging sign. It has to be noted though, that India's current emission trajectory is still compatible with a 2C pathway, but just so. And in the recent mini climate summit at the UN, India refused to upgrade its NDC, as it has done for its renewable energy target earlier.



What Can India do to improve its NDC-Compliance and even go beyond?

There are few ways that India can attain its NDC pledges, and also be compliant with a critically needed 1.5C pathway on its fair share basis. A detailed deliberation on these is beyond the scope of this article, but a quick look at some of the low hanging fruits are noted below:

- India has about 220,000 MW of installed coal power plants (including non-utility power plants), which contribute to a major part of its CO₂ emission, its massive air pollution and also the high amounts of industrial water consumption and thermal pollution, devastating riverine and coastal fisheries. About 50,000+ MW of this capacity is over 25 years old (in 2020), which are much more polluting and are energy inefficient. Thus, the operating costs of these are higher (though their capital costs might have been recovered /amortized already), particularly with the coal prices going up. Moreover, all these old plants have to incur huge additional capital expenditure to comply with the (extended) 2022-deadline for emission and water consumption norms (that were first to be achieved by December 2017, but extended by MoEF&CC under industry pressure, endangering public health further). It makes good

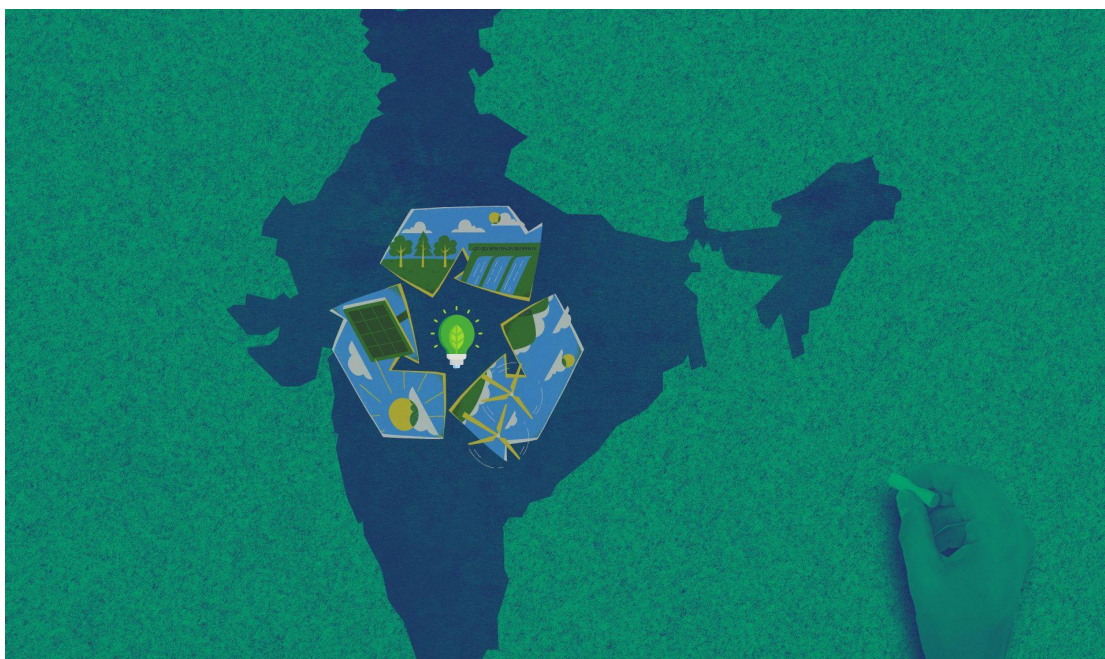
economic and business sense to permanently close down these old plants rather than invest huge additional capital, when new solar is much cheaper to install and produce power. This will also save huge amounts of CO₂ emissions and add large public health benefits as added bonus.

- This is not going to impact India's available power capacity much, as our present total installed capacity of over 402,000 MW far exceeds the present peak (summer) demand of about 200,000—210,000 MW, even considering the lower Plant Load Factors of Solar and Wind power plants. On the contrary, the newer and more efficient coal plants can run at a higher PLF, better recovering their investments. Coal power plants in India have been forced to run at a low 55% PLF now, due to lack of demand/ over capacity on the grids. On any given month, a large number of these old power plants are always off-grid, either shut down, or under maintenance. While not significantly affecting power availability, this action can eliminate a huge chunk of damaging air pollution, reduce industrial water consumption in these times of climate crisis, and stop the economic drain of running un-remunerative power plants.
- A massive shift from private car-borne transport (for the middle and upper classes mainly), to large scale, energy efficient electric mass transport, like trains, trams, electric buses. This will drastically reduce the other major source of both CO₂ and air pollution, petroleum products. And electric mass transportation modes are very easy to plug onto renewable energy sources. The technologies and some of the infrastructure for this exists or are on their way, yet it needs a larger policy push. The GOI is pushing for large scale private EVs (Electric Vehicles in the form of 4-wheelers), which – though much less emission intensive than IC (Internal Combustion) cars over their lifecycle, have large metals, plastics, rubber requirements per vehicle. Private car-borne transportation is also a big drain on urban and other road space, being much less efficient than public transport.
- The need for affordable private transportation in an informal sector dominated large country cannot be underestimated. The underpaid regular workers as well as over 90% of low-earning informal economy workers in the last 15-20 years has led to a huge shift towards lower cost scooters and motorcycles, often old ones purchased as pre-owned pieces. These have added the necessary mobility at the lower end, while increasing both CO₂ emission and air pollution massively. A clear policy shift accompanied with economic incentives, towards lower cost electric two-wheelers will help clean up our climate and pollution acts, while increasing affordability of personal transportation, as electric vehicles cost much less to run than petroleum fuelled ones. All the technologies are already here and over a dozen companies are now manufacturing electric two wheelers in India. Infrastructure for low-power E-two wheelers, in terms of charging stations, are much less costly and easier to build than high power charging infrastructure for E-cars.
- Another fast growing source of emissions which needs to be tackled soon is domestic aviation. With medium-high speed rail network, most of the sub-500 KMs flights can be effectively eliminated (without any significant increase in total travel time, door to door), and sub-800 KMs flights can be drastically reduced. The indigenously developed Train18, which has started operating in some sectors as “Vande Bharat Express”, can run with top speeds of 180 KMPH, on existing trunk network of today's railway tracks. This eliminate the need to build very expensive and energy intensive cement-steel-concrete high speed rail roads (famously called Bullet Trains). A Delhi to Bhopal flight by a Boeing 737, carrying 150 persons will consume about 2.5 Tons of petroleum derived Aviation Turbine Fuel. For an electric train getting its electricity from renewable sources/ grid, this would be drastically reduced (some auxiliary uses will still remain, apart from the embedded energy/ emission). And the advantage improves over every passing month and year. Even a big diesel locomotive will burn roughly half the amount of fuel for the same journey, carrying 4-5 times as many

passengers, city centre to city centre. These also boost economies of the many cities they serve.

- Strongly incentivising distributed Solar and other renewable, particularly for revitalising rural economies. The recently launched KUSUM (Kishan Urja Suraksha evam Utthan Mahaabhiyan) scheme is a good beginning, particularly with an allocation of over Rs.34,000 crores, but not being pursued with vigour (with the financially strained DISCOMs putting all kinds of obstacles to people interested in installing Solar PV in their premises/ land). We need to formulate and aggressively implement many such schemes with incentives, for many other distributed no/low-carbon, low-total-pollution power production and utilization possibilities.
- There are seemingly insurmountable difficulties of creating additional carbon sequestration capacity on a massive scale (Pledge no.3 in NDC), particularly in a country with high population density (India has only about 2.4% of global land area, which has to sustain about 18% of global population now). So it seems if the GOI wishes to go ahead with this, there will be innumerable land-use conflicts, with its poorest and most vulnerable citizens (a history we are continuing from our colonial past, when most 'commons' were made 'government property', with the unjust 'eminent domain' of State). But today, there seems to be a way out with the 2006 Forest Rights Act. If the government goes with the real spirit of the act, rights of traditional forest dwellers over large tracts of 'degraded forest' lands can be recognised, and government and forest people can jointly nurture these forests back to health with all non-timber benefits going to the people living there.
- Though not a low-hanging fruit, another crucial step is a massive shift away from energy and emission intensive industrial agriculture to a low energy, low input and low pollution agro-ecological domain in the country. Industrial agriculture and its associated activities are not only a major GHG emitter, they are also a major contributor to the frightening mass extinction (the sixth one in Earth's known history) that we are now witnessing, and which we humans have begun. They are also a major water pollution contributor. Agro-ecological practices have been shown to require about one-third the emissions compared to present industrial agriculture (various estimates exist), for the same amount of food production.

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Hence, what India has pledged and what we have achieved is not sufficient to contribute our fair share of climate protection for a safer 1.5 C temperature rise limit (by the end of this century) agreed upon. This is not to ignore the fact that industrialised and wealthier countries need to do far more and have not done even as much as India has done, being a lower-middle income country with largest number of poor people in the world. The fact remains that most of the actions suggested in this paper go far beyond a reduction in India's emissions. They will also very significantly contribute to the economic and environmental security of its 1.40 billion people, while reducing the threats of severe pollution and public health impacts, and build resilience against climate change impacts. This will not be a small gain for some real win-win climate actions.

****Note:** (As some Figures vary somewhat from study to study, nearby rounded figures are used here).

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