

# INDIA, PARIS AGREEMENT AND DOMESTIC ACTIONS

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*India has approached climate change mostly through the lens of the international climate negotiations as a foreign policy issue. In the process, it has somewhat lost sight of the science and the imperatives of the severe climate impacts India will likely face. With India seeking closer ties with the US, small island states and least developed countries now perceive India as part of the problem despite the emission reductions India belatedly committed to. India's Nationally Determined Contributions (NDC) submitted under the unscientific and iniquitous Paris Agreement is moderate and achievable, but touches only on a few sectors, and lacks a cross-sectoral, multiple-benefits approach. Most regrettably, it has few offerings on badly-needed adaptation measures. India is still floundering in search of the required transformational development pathway towards a low-carbon or non-fossil fuel future.*

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*The rain it raineth every day  
on the just and on the unjust fella  
but mostly on the just because  
the unjust stole just's umbrella*

...Anonymous

## **Hurting Towards Catastrophe**

**I**t used to be a cliché some years ago to say we should not speak of climate change any more but a climate crisis. Today the preferred term is climate emergency.

All scientific evidence now points to the planet hurtling towards irreversible climate change, with temperature rise of around 3.2 degrees C by the end of this century, even if all countries abide by the emission reduction commitments they have made under the 2015 Paris Agreement (PA).<sup>1</sup> The Intergovernmental Panel on Climate Change (IPCC) has been extremely cautious about its projections, speaking of degrees of certainty, temperature ranges and probability of reaching them, not more exact predictions which are not possible for these complex phenomena. Yet the trends are clear and indisputable.

Going by recent evidence (see Adve in this issue), the situation is more grave than earlier thought. The past three decades have been the warmest since industrialization, extreme weather events are increasing in frequency and severity, ocean levels and temperatures are rising rapidly with high acidification, melting of polar ice and glaciers is accelerating, all with multiple and severe impacts on global and regional climate, and on animal and plant life.<sup>2</sup> Worse, global emissions have been rising at an even higher rate of 1.5 percent per year during the past decade, with no signs of peaking let alone declining.

**How Did We Get Here? :** The short answer to this question is politics. All through the tortuous international climate negotiations, industrialized countries (IC) of the global North have perpetuated their occupation of the atmospheric commons, consolidating a massive economic advantage and domination over the world. ICs have developed by burning fossil fuels for electricity, transport, factories and affluent lifestyles and have dumped resultant

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carbon dioxide (CO<sub>2</sub>) and other greenhouse gases (GHG) in the atmosphere. Over 75 percent of atmospheric GHGs have emanated from ICs since the industrial era.<sup>3</sup>

The United Nations Framework Convention on Climate Change (UNFCCC) itself, due to persistent intervention by leading developing countries (DCs) and India in particular, notes this historical responsibility of ICs in its Preamble. In accordance with the established ethical and legal principle of “polluter pays,” it therefore states in Article 3.1 that “the developed country Parties should take the lead in combating climate change and the adverse effects thereof,”<sup>4</sup> and lays down the operative guidelines for the “common but differentiated responsibilities”<sup>5</sup> (CBDR) of developed and developing countries respectively.

The Kyoto Protocol (KP) agreed in 1997 but entering into effect in 2005 laid down that ICs would reduce “their overall emissions of such [greenhouse] gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012”,<sup>6</sup> and exempted developing countries (DC) from mandatory cuts. However, in the prolonged process of finalization and ratification, ICs extracted numerous concessions and severely diluted the KP provisions.<sup>7</sup> KP as finalized allowed offsets, (i.e. ICs undertaking emission reduction in DCs in lieu of expensive emission cuts in their own countries), gave leeway to some ICs for continued high use of coal, and permitted former Soviet bloc countries to count the drop in emissions arising from their post-Soviet economic decline as “emission cuts.” The US extracted many such concessions by constantly threatening to walk out of KP, yet finally did so under President George H. W. Bush, while staying on in the UNFCCC and continuing its disruption.<sup>8</sup>

The failure of KP, as attested to by a rise of global emissions by 32 per cent from 1990 to 2010,<sup>9</sup> combined with alarming new scientific findings on climate change, led to a series of moves in the UNFCCC negotiations and at several US-led multilateral gatherings, that ultimately led to a completely new global emissions control regime in the Paris Agreement (PA) of 2015. Unfortunately, PA too has not delivered desired outcomes due its own architecture.

**To Paris Via Copenhagen – India’s Role :** Release of the Fourth Assessment Report of the IPCC (IPCC/AR4) in 2007 triggered a major shift in the international discourse on climate change among scientists, academics, think tanks, activists and governments. IPCC/AR4 reported rapid and sharp increases in global emissions and climate impacts, and urged urgent action to cut emissions. It called for ICs

to undertake deep cuts reducing emissions by 2020 to about 40 percent less than 1990 levels and around 90 percent less by 2050.<sup>10</sup> A massive upsurge in popular movements followed worldwide, demanding that governments urgently address this crisis, with many calling for radical social transformation captured by the slogan “system change not climate change.” Political parties and governments came under public pressure to respond, especially in Europe and the West in general. Vulnerable Small Island Developing States (SIDS) and Least Developed Countries (LDC) increasingly perceived the climate crisis as an existential threat, and other DCs too pressed for deep IC emission cuts.

Meanwhile, a reshaping of the global order led by the US was underway. The US under then President George W. Bush, convened regular meetings of the G7 advanced countries, soon calling Russia to join in a G8, and thereafter invited 5 major DCs now showing high economic growth, namely China, India, Brazil, Mexico and South Africa to regularly participate in G8+5 Meetings. This new “Major Economies Forum” (MEF) was to discuss the global economy and other international issues including climate change.

India approached climate change mostly through the international negotiations, mainly as a foreign policy matter. India’s positions followed a chequered trajectory.<sup>11</sup> In the early years, India made insightful interventions such as initiating the idea that historical emissions by ICs were mainly responsible for the problem, and that global emissions control agreements must be based on equity between nations, with per capita emissions, as the appropriate metric.<sup>12</sup> India also countered attempts by the US to shift the blame from fossil fuel burning by ICs to methane production by ruminant animals and paddy cultivation by DCs especially in Asia.<sup>13</sup> However, India later went into a long spell of marking time, with a defensive approach mostly warding off pressures from ICs.

In the new millennium, India too was going through a post-Soviet transformation in its economy and foreign policy, and pursued a “strategic partnership” with the US. With growing recognition of its economic growth and standing in the world, India was now claiming a place alongside other major powers, and saw its participation in these G8+5, soon G20, Summits as symbolic of its having joined the big league. India was now happy to go along with US ideas.<sup>14</sup>

The formulations in MEF communiqués presaged those in the Climate Summits in Copenhagen in 2009 at

Cancun in 2010, where they were formalized, as well as in Paris where they were given final shape in PA. New elements included overturning the architecture of the Kyoto Protocol with its firewall between ICs and DCs; ignoring historical emissions and adopting a “forward-looking” perspective looking only at future emissions; (c) voluntary pledges by *all countries* replacing quantitative targets only for ICs; and (d) no cognizance of per capita emissions as a metric of iniquity between nations.<sup>15</sup>

In a signed opinion piece in an influential US newspaper soon after the Copenhagen Summit, then Secretary of State Hillary Clinton, serving in the Obama administration, claimed victory for having secured this US-piloted new emissions control architecture, specially mentioning the “forward-looking perspective” and the “single framework” for all countries.<sup>16</sup>

In pursuing a strategic partnership with the US, India had drifted away from its traditional DC allies, certainly in the climate negotiations. Crucially, India found it difficult to square the circle of high economic growth with growing international clout, and simultaneously suffering severe development deficits and poverty burden domestically. Egged on by the US and EU, LDCs, SIDS and many other DCs now began perceiving India, along with China and a few other large DCs, as part of the problem. So when the US and its allies pushed for these “emerging economies” to join them in taking on commensurate emission reduction obligations, various DC groupings joined in this demand, adding to the pressure on India.<sup>17</sup>

An influential set of activist groups, think tanks, academics and policy experts under the banner “Campaign for Progressive Climate Policy in India” recommended in 2008 that India at its present stage of development, should offer to slow its emissions growth rate, but *conditional upon* ICs undertaking deep cuts as called for by the IPCC.<sup>18</sup> This coalition had taken shape around advocacy for such a new paradigm by the Peoples Science Movement\* soon after release of IPCC/AR4.<sup>19</sup> While India did table emission reduction pledges at Copenhagen, it did so *unilaterally* and much after China and other DCs had taken similar positions. India thus lost the opportunity to enhance its moral standing in the negotiations, exert pressure on the ICs, and convince LDCs and SIDS that, despite not being part of the problem, India wanted to be part of the solution.

## **Paris Agreement (Pa) And India**

Many observers of the international climate negotiations including activist NGOs welcomed PA, even with qualifications. It is difficult to dispute that, after such long and contentious negotiations, having any Agreement between all countries to combat the climate crisis, is an achievement, and provides a base for future improvements. However, experience with KP teaches that weak structures can lead to failed outcomes.

In that sense, PA is truly disappointing. It is weak on science, does not facilitate its own goals, fails on equity, and does not advance the transformational pathways needed to move away from a fossil-fuel based world.

**PA, Science and Emission Goals :** IPCC/AR5 looks at mitigation trajectories for pathways towards different atmospheric GHG concentration levels over this century, and projects temperature rise at points along the way. Based on the optimum pathway that enables temperature rise to be kept under 2°C, the Report gives estimates for cumulative emissions required for achieving 2°C (or for the 1.5°C aspiration),<sup>20</sup> based on the idea of carbon budgets, i.e. how much carbon or CO<sub>2</sub> the atmosphere can hold for the specified temperature goals.

IPCC/AR5 concludes that, with a total carbon budget of 3000 GtCO<sub>2</sub><sup>†</sup> for 2°C, of which around 2000 GtCO<sub>2</sub> has already been emitted, a balance of only 1000 GtCO<sub>2</sub> is left till the year 2100. Cumulative emissions from now till 2030, as per the NDCs under PA, are a further 750 GtCO<sub>2</sub>. This leaves only 250 GtCO<sub>2</sub> for the period 2030 to 2050 and beyond till 2100.<sup>21</sup> To put this in perspective, current emissions (2017) of the US are 5.1 GtCO<sub>2</sub>, of China (the world’s largest emitter) 10.9 GtCO<sub>2</sub>, and India 2.45 GtCO<sub>2</sub> per year.<sup>22</sup> In such circumstances, limiting future global emissions to just 250 GtCO<sub>2</sub> for all 195-odd countries appears improbable.

PA requires each country to declare *voluntary* emission reduction pledges or Nationally Determined Contributions (NDCs) to global efforts, an architecture supposedly superior to Kyoto because the latter externally imposed mandatory targets. Problem is that PA has no mechanism to ensure that the sum of these NDCs enables the 2°C target! This has predictably led to a race to the bottom, with countries seeking to match low targets set by other nations.

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\* full disclosure: the author was a key actor in this initiative

† 1 Gigaton = 1000 Megaton or 1 billion tons

The UN Environment Programme has estimated that, with global emissions currently at 55.3 GtCO<sub>2</sub>-eq,<sup>\*23</sup> and rising at the rate of about 1.5 percent annually over the past decade<sup>24</sup> global emissions may be at 60 GtCO<sub>2</sub>-eq in 2030 with extant trajectories and at 56 GtCO<sub>2</sub> eq if NDCs are adhered to.<sup>25</sup> This is doubtful given past track records. Further, by 2030 global emissions are required to be 41 GtCO<sub>2</sub>-eq for 2°C (or 25 GtCO<sub>2</sub>-eq for 1.5°C), leaving a yawning gap of 15 GtCO<sub>2</sub>-eq for 2°C (and 32 GtCO<sub>2</sub>-eq for 1.5°C) between projected global emissions at current NDC levels and what they should be in 2030.<sup>26</sup> The longer it takes to implement stiffer targets, the higher those targets get in terms of percentage reduction per year.

The other targets, for peaking of global emissions almost immediately, and achieving net-zero emissions by 2050, are also looking increasingly difficult.<sup>27</sup> The Climate Summit in 2020 is to discuss raising NDC commitments, but there is little optimism about this.

**Deeply Iniquitous :** PA ignores equity between nations since it disregards historical emissions especially by ICs and also overlooks the metric of comparative *per capita* emissions by nations. This disproportionately burdens India and other DCs with greater emissions reduction in the future.

Scientists from TISS have estimated that India's own requirements during 2030-2100 would be around 80 GtCO<sub>2</sub>,<sup>28</sup> with current emissions being around 2.5 GtCO<sub>2</sub> per year and still rising. As may be imagined, it would be very difficult for India to have access to around one-third of the total remaining global carbon budget of 250 GtCO<sub>2</sub>. In fact, India faces a double whammy because of its low *per capita* emissions. China's per capita emissions are currently (2018) 8.0 tCO<sub>2</sub> pa and USA's 16.1 tCO<sub>2</sub> pa, while India's are 1.9 tCO<sub>2</sub> pa<sup>†</sup>, well below the global average of 4.35 tCO<sub>2</sub> pa<sup>29</sup> and likely to remain so even by 2050.<sup>30</sup> India will struggle having to address its poverty and development deficits, and simultaneously reduce emissions significantly!

It would also be readily seen that, if the goal for limiting global temperature rise is lowered from 2°C to 1.5°C, then the pressure on DCs and India in particular gets even worse, perhaps even impossible. For the world as a whole, with a total budget of only 2500 GtCO<sub>2</sub> till 2100 for 1.5°C, of which 2000 Gt has been used and 750 GtCO<sub>2</sub> committed till 2030, a negative carbon budget of minus 250 GtCO<sub>2</sub> from 2030-2100 is left, meaning the

world must not just have zero emissions, but should also be able to "suck out" or otherwise absorb a further 250 GtCO<sub>2</sub>!

**Two Myths :** The overwhelming narrative nowadays, including by climate activists who should know better, has been on *global* emissions, and on *the* temperature goal of 1.5°C. Both these narratives mythologize crucial aspects of the climate crisis, especially regarding the differentiated roles of ICs and DCs in ameliorating it.

We have already discussed the 1.5°C issue in detail. The mythologizing lies in casting it as *the* goal, rather than the goal being, as PA states, "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and *pursuing efforts to limit the temperature increase to 1.5°C*"<sup>31</sup> (emphasis added). PA in fact did *not* set a hard goal of 1.5°C, which would have formally declared an almost unachievable target, but rather an *aspirational* one.

As for global emissions, it is true that science can only look at emissions and their outcomes at a global level. On the other hand, PA deals only with regulation of *national* emissions. So continued emphasis on global emission targets raises a moral hazard, allowing some countries to set low national targets or under-perform, (as the US and some other ICs have done), while pressuring other countries to cover resultant gaps in the global target by raising their own targets or performance. Therefore, whereas targets such as global peaking years or net zero global emissions highlight the problem in overall terms, they also risk becoming cover for ICs to hide their culpability, masking the necessary differentiation between IC and DC targets, and shifting the burden to DCs.

### **India's NDC and Domestic Action**

India's NDC under PA must be understood as a part of its overall response to the problem of climate change.

As seen earlier, India's approach to climate change has mostly been externally driven and viewed through the lens of the international negotiations as a foreign policy issue. India turned its attention to domestic actions only as a consequence to its international commitments.

This is in marked contrast to most other developing countries, especially LDCs and SIDS, for whom the main drivers were the huge climate impacts on their nations.

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\* Gigatons of CO<sub>2</sub> equivalent i.e. total quantum of all GHGs if all gases were normalized to equivalent CO<sub>2</sub> values based on their global warming potential (GWP), an equivalence table for which has been laid down by IPCC.

† Tons of carbon dioxide per annum

Reduction of global emissions, especially deep cuts by and financial support from ICs, therefore became critical to them.

Unfortunately, India's official position never embraced this idea. Since India and South Asia are among the regions worst affected by impacts of climate change,<sup>32</sup> it is in India's vital national interests to push for higher ambitions in global emission reductions with ICs undertaking the deepest cuts. This failure to internalize domestic climate impacts and build them into India's negotiating stance, not only affects India's approach and strategy in the international negotiations, it also seriously impairs India's own preparedness to face, adapt and build resilience to climate impacts. This is reflected in India's NDCs and in India's developmental programmes.

**Climate Impacts on India :** A brief sketch of the likely impacts on India, based chiefly on India's Second National Communication to the UNFCCC in 2012, the latest such official document,<sup>33</sup> would underline this point. Volume II of IPCC Assessment Reports and the various State Action Plans on Climate Change (SAPCC) also provide additional information (see also Anu Jogesh and Mridula Mary Paul, and Nagraj Adve in this Volume). However, more granular meso-level data are unfortunately yet to be systematically compiled,<sup>34</sup> itself a major impediment to formulating adaptation or resilience actions.

India has witnessed average temperature rise of about 1°C in the past century, with both maximum and minimum temperatures rising faster recently. Temperature rise has been projected to be near 4°C towards 2050 and "may even exceed 4.5°C..." towards 2100."<sup>35</sup> Changes in climate as well as local and seasonal weather have been noted too. Monsoon variability has already been observed with shifts in onset and retreat, and significant changes in rainfall patterns. Years with both excess and deficit rainfall are more frequent. Number of rainy days may decrease, but frequency of extreme rainfall is increasing, "with an alarming rise in... intensity"<sup>36</sup> in recent decades, as evidenced in the disasters in Uttarakhand and Kerala, and severe urban flooding in Mumbai, Chennai and other cities. Tropical cyclones are expected to increase in frequency and severity. Sea-levels will rise by over 1m by mid-century, bringing inundation, saline water ingress into land and groundwater, and coastal erosion, together having serious impacts on major coastal cities and 600 million people living in coastal regions.

Floods and droughts are both likely to increase, and water stress is likely to worsen especially in the densely populated Ganga basin, a situation further exacerbated by a serious shortage of water storage.<sup>37</sup> Himalayan glaciers are experiencing "rapid and unprecedented rates of melting," resulting in almost certain reduction in river discharge which will increase vulnerability.<sup>38</sup>

Significant impacts are expected in agriculture due to changes in temperature, atmospheric carbon dioxide levels, weather, rainfall patterns and water availability, especially with around 60 percent cultivated area being rain fed. Rice and wheat yields are expected to decline substantially, the latter perhaps by 30 percent or more, while yields of other major cereals and food crops are also expected to decline. Milch and meat animals will face thermal stress, fish populations are expected to shift habitat, and many plantation crops may also be affected.

Needs in each of these sectors will have to be assessed and addressed in detail down to the meso level and existing developmental programmes re-oriented to tackle these needs, besides assessing new or other needs that require separate and substantial additional funds. There is however little evidence of systematic need-based actions being taken by Central or State governments, with doubts about their capacity to address these problems or transfer coping or resilience strategies to the field.

A large and widening "adaptation gap" is therefore seen to exist between developmental efforts currently underway and those needed to overcome climate impacts.

**NDC Targets and Sectors\* :** India's NDC puts forward a fairly detailed set of proposed domestic climate actions, dealing mostly with mitigation in a few sectors. It is truly unfortunate that India's NDC barely deals with adaptation and resilience except to recount old plans. NDCs were expected to enable governments to conceptualize and plan integrated domestic policies and programmes, and India's submission disappoints on this count too. The NDC was the first opportunity for the BJP-led government to undertake such a task, after its predecessor government had formulated the National Action Plan for Climate Change (NAPCC) in 2008, which had proffered a set of Technology Missions, the somewhat more detailed and economy-wide sectoral plans in the Report of the Expert Group on Low-carbon Development for Inclusive Growth (2013),<sup>†</sup> and the

\* This section and the next draw *inter alia* from material used in the author's chapter, "Factors shaping India's International Climate Policy," in Natalia Ciecierska-Holmes, Kirsten Jörgensen, Lana Laura Ollier and D. Raghunandan (eds), "Environmental Policy in India," Routledge, December 2019, which discusses these issues in greater detail.

† Full disclosure: the author served as a Member of this Expert Group during 2011-13, but resigned thereafter.

State Action Plans, all of which are supposedly subsumed under the NDC.

It is also unfortunate that India's NDC does not discuss the global emissions reduction scenarios relating to the 2°C and 1.5°C goals, especially the implications for India as discussed in the preceding Section. That would have been useful for domestic stakeholders and to assist future development planning in a carbon-constrained scenario. As it stands, it appears as if the NDC is intended primarily for international audiences and not as a template for domestic development policy.

**Headline Target Moderate Effort :** India's NDC declares that it would reduce Emissions Intensity (EI) of GDP (i.e. Emissions per Unit of GDP) by 33-35 percent by 2030 compared to 2005 levels.<sup>39</sup> This shows that the paradigm shift from the pre-Copenhagen position of refusing to take on mitigation commitments on grounds of being a developing country, has been accepted by most policy actors in India across the political spectrum.

India's NDC is a bold commitment for a developing country with high development deficits, but must nevertheless be viewed only as modest. It has targets in only a few sectors, avoids many important ones, contains no cross-sectoral understanding or programmes, and is a mostly top-down effort with little consultation with stakeholders as required by the phrase "nationally determined."

India's headline target has been assessed by international agencies as moderate<sup>40</sup> but, in comparison with other G20 nations, as "the most ambitious, closest to the 1.5°C limit."<sup>41</sup> Looked at more closely, the target is a rough extrapolation of the earlier Copenhagen/Cancun pledge of reducing emissions intensity by 20-25% from 2005 levels by 2020, which works out to an average decline of roughly 1.6% p.a. However, NDC itself states that India's energy intensity showed a decline from 2005 to 2010 of around 12.5 percent i.e. 2.5% p.a.<sup>42</sup> It is therefore not surprising that India on track to meet its NDC targets,<sup>43</sup> and indeed also likely to achieve its NDC goals almost a decade earlier at least in some respects!<sup>44</sup>

The NDC relies on two main sectoral targets to realize this headline goal. These are briefly discussed below.

**Non-Fossil Fuel Energy :** First is a steep increase in non-fossil fuel electricity generation capacity to 40 percent of the total by 2030,<sup>45</sup> up from 33 per cent in 2015, keeping in mind that electricity from coal is also expected to increase substantially by then. Subsidiary targets include

175,000 MW of renewable energy (RE) by 2022, of which 100,000 MW would be from solar and 60,000 MW from wind, with a further 63,000 MW from nuclear power subject to conditionalities of the Nuclear Suppliers Group (NSG).

Some agencies have assessed that India may reach this target as early as 2020!<sup>46</sup> Others have noted that, if India does achieve this target and continues to expand its RE capacity including large hydro even at a slower rate, India may well exceed its NDC emissions intensity target by a fairly wide margin, perhaps taking it to around 41-42 percent below 2005 levels by 2030.<sup>47</sup>

The solar power goal, originally announced in 2015, is a laudable and significant increase over the earlier target of 20,000 MW by 2020 under the Solar Mission of the NAPCC.<sup>48</sup> However, performance relative to the target presents a mixed picture.

Whereas early years showed a rapid increase of solar photo-voltaic (SPV) power capacity due to drop in solar panel prices, the growth rate shows clear signs of plateauing out, raising concerns. A Parliamentary report noted that, in order to achieve the 100,000 MW solar target by 2022, India should have had an installed capacity of 32,000 MW by 2017-18 but had achieved only 18,455 MW by early 2018, leaving a balance much higher than achieved so far.<sup>49</sup>

Problems identified in scaling-up include grid capability, especially with regard to high variability in generation, weaknesses in evacuation and distribution networks, transmission and distribution losses, and frailty of utilities.<sup>50</sup> Low levels of both domestic and foreign investment have also been underlined.<sup>51</sup>

Others have also stressed the need and potential for large storage systems which India does not yet possess in both grid-connected and off-grid RE electricity.<sup>52</sup> However, the NDC does not dwell on the need for technology capability, unlike the NAPCC whose Solar Mission included relevant objectives such as solar manufacturing and storage capability.<sup>53</sup>

Access to electricity also remains a big worry in India despite recent progress in rural electrification. It has been estimated that around one-third of the population, mostly in rural areas, do not receive electricity supply,<sup>54</sup> with poor quality and irregularity of supply being widespread complaints even among the rest. The NDC stresses the government's policy of "electricity for all" by 2020, but such promises have seen end-dates extended repeatedly

earlier too. It is important to note that an exclusive focus on electricity supply as against universal access and quality will continue to hamper domestic energy equity and quality of life.

NDC proposals for nuclear power and a push to large hydro-electric power generation are questionable. The former is bedevilled by local protests, and high costs and risks. Most large hydro potential seems exhausted except in the North-East where they face grassroots opposition. India's hydel capacity has come down to just 13 percent of the total from a one-time high of around 50 percent.<sup>55</sup>

**Forest/Tree Cover :** The second main sectoral target is to increase forest/tree cover to 33 percent by 2030 from 23.4 percent in 2005, a reiteration of earlier targets including in NAPCC.<sup>56</sup> Subsidiary targets of increasing area under forest/tree cover by 5 million hectares (mha) and improving the quality of forest/tree cover in another 5 mha are together expected to increase sequestration by 100 million tonnes of carbon dioxide per year or 2.5-3 GtCO<sub>2</sub> overall.<sup>57</sup> Mention is also made of the Green Highways programme earlier initiated by the government<sup>58</sup> under which trees would be planted along 140,000 km of highways to sequester 1.2 million tons of carbon.<sup>59</sup>

The persistent conflation of "tree cover" with "forest cover" in the NDC and other government policy documents, read along with the importance given in the NDC to \$6 billion worth of compensatory afforestation for various infrastructure or industrial projects, are problematic.

Experts have long voiced concern at such conflation, often resulting in overestimating forest cover and hence sequestration capacity.<sup>60</sup> Monoculture planted forests or plantations have considerably less potential than natural mixed forests, and provide different social and ecological services.<sup>61</sup> A recent expert panel report therefore recommended distinct methodologies for assessing non-forest green cover.<sup>62</sup> This assumes significance given notable policy trends under the present government jeopardizing integrity of forest areas, relaxing restrictions on development activities in forests, and permitting diversion of forest lands for irrigation, mining, highways, "linear projects" and infrastructure.<sup>69</sup>

In contrast with the NDC's almost exclusive focus on carbon sequestration, NAPCC's Green India Mission also envisaged co-benefits in bio-diversity, ecological services, and social and livelihood benefits for forest dwellers etc.<sup>64</sup> re-emphasizing the co-benefits approach taken by the NAPCC but not by the NDC.

**Other Sectors/Programmes :** Several other measures are included in the NDC but with few or minor quantitative deliverables.

Transport is the second highest sector in terms of total emissions in India.<sup>65</sup> Road transport accounts for 87 percent of these emissions which are rising fast given rapid increase in numbers of personal vehicles.<sup>66</sup>

An integrated perspective on transportation would have been useful, but the NDC contains only rather disjointed suggestions.

Some inter-modal shift from road to rail is envisaged by the NDC, amounting to an increase of rail share from 36 to 45 percent, presumably till 2030.<sup>67</sup> The NDC estimates that the two dedicated rail-based freight corridors being built would reduce emissions by 457 million tons of CO<sub>2</sub> over 30 years.<sup>68</sup> The promised increase in the inter-modal share of rail is perhaps too low a target since expert bodies have earlier suggested an increase to 50 percent by 2030,<sup>69</sup> which would significantly reduce emissions with co-benefits in providing better long-distance transport for lower-income passengers, an aspect not specifically addressed by the NDC.

In fact, the NDC underplays mass public transportation which is dealt with mainly with reference to metro rail projects, expected to operate in only a few large cities. Mass transport by bus or surface rail in under-served cities could have major mitigation benefits and co-benefits such as reducing air pollution, freeing up road space for improved habitat, and decreasing the prevalent sharp inequity in transportation access.

NDC also does not touch upon rapidly rising emissions from domestic aviation, with double-digit growth rates over many recent years,<sup>70</sup> and no policy prescriptions for relative prioritization of different transportation modes and infrastructure.

The sub-section on Bio-fuels essentially repeats an earlier aspirational target of 20 per cent blending of both bio-ethanol and bio-diesel with petrol and diesel respectively.<sup>71</sup> Both have had numerous problems including competing demands for land, other resources and viability,<sup>72</sup> such that India has struggled to reach even the 2 percent bio-ethanol and 0.1 percent bio-diesel blending level in 2018.<sup>73</sup> Unsurprisingly, the National Bio-fuels Policy 2018 has revised the bio-diesel target down to 5 percent.<sup>74</sup> The caution of the Food and Agriculture Organization against use of land for fuel rather than food is also germane.<sup>75</sup>

Technologies to reduce energy consumption for cooling in residential buildings has not been touched on,

along with less carbon-intensive building technologies. While energy efficiency of air conditioners, currently registering double-digit annual rise in sales, is being separately addressed,<sup>76</sup> energy use in buildings, estimated to be around one-third of India's total energy consumption,<sup>77</sup> could also be substantially reduced. With rapid urbanization in India and growing demand for homes, office space, commercial buildings, and better-quality rural housing, a sizeable percentage of the future building stock, estimated to be around two-thirds the total,<sup>78</sup> is yet to be built<sup>79</sup>. India risks huge carbon lock-ins\* over the long-term if it does not address this issue urgently.

### **Other Issues**

While NDCs are supposed to incorporate all other climate change related programmes, and India's NDCs too claim to have done the same, a few comments may be useful here.

Most NAPCC missions have made poor progress and are in fact languishing due to late and poor funding, and even lower spending,<sup>80</sup> weak institutional arrangements,<sup>81</sup> and general lack of political backing and serious intent, even in important Missions relating to Agriculture, Sustainable Habitat and Water Resources. The Knowledge Mission has thrown up several research projects but these appear to be somewhat disparate, without a clear sense of direction,<sup>82</sup> and little visible impact on policy (see also Alak Ray in this Issue).

State Action Plans on Climate Change (SAPCC) have also been formulated with assistance of multilateral and bilateral international agencies. Research suggests that the SAPCCs, rather than being concrete programmes of climate-specific action, are best regarded as the beginning of a more systematic examination of potential state-level programmes, particularly as regards adaptation.<sup>83</sup>

The NDC also mentions the government's ambitious programme for promotion of electric vehicles.<sup>84</sup> Developments in this area would be followed with interest since such government plans have been repeatedly modified in the past under industry pressure,

### **Closing Remarks**

The enormous literature now available on climate change and how to tackle it, in terms of both containing it through mitigation and coping with it in terms of adaptation

and building resilience, communicate some seemingly simple but profound lessons not well appreciated yet.

Mitigation is not just about reducing emissions from select sectors, but about integrated actions across sectors. This would mean looking for strategies or measures that bring multiple benefits in different sectors, as briefly discussed above in several aspects of the NDCs. Moving towards a non fossil-fuel future will require not just sectoral actions but transformative development strategies and different ways of organizing the economy, production and consumption patterns, generation and use of energy, and lifestyles.

Climate change issues need to become integral parts of long-term (low-carbon) developmental planning and implementation within a holistic framework.<sup>85</sup> Efforts made today must keep in sight, and work towards, such societal transformations as would prevent path dependence, i.e. developmental paths that will have longer term negative consequences across sectors and also become roadblocks to alternative strategies or measures. IPCC/AR5 gives the following example: "Development of inter-city highways may make further extension of the road network more likely (eg. for feeder roads) but also make further extension of rail networks less cost-effective by drawing out traffic and investment financing, thereby diminishing the prospects for alternative transportation investments."<sup>86</sup>

As a nation, India has not even begun the discussions required to move in this direction, with government planning and work trapped in separate silos. India's NDC reflects this starkly. It is hoped that this short article has shone at least some light on the track towards such thinking.

It is truly unfortunate that insufficient attention has been paid in the NDC, and generally in governance in India, to adaptation and building resilience to climate change. Most aspects touched on are, in fact, mostly on-going mainstream programmes or have remained as pilots. Here too, measures that would bring benefits across sectors, as well as between mitigation and adaptation, will be required. Indeed, these need not be seen as discrete, but as inter-related and complementary in terms of policy frames, outcomes and capabilities.

Many other major actions will be required but these must be goal oriented and needs based, requiring detailed research, data generation, and public consultation. Actions would be substantially localized, calling for huge human and financial resources. Adaptation planning should

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\* Refers to doing things today in a manner that uses a lot more carbon, and hence "locks it in" than by using better technologies, particularly on long-lasting infrastructure such as roads, buildings etc.

embrace “multi-metric analysis encompassing cost-benefit and other monetary items plus non-monetary measures.”<sup>87</sup> The longer intervention is delayed, the higher the cost will get for more drastic actions that would be needed later. While likely expenditures on adaptation and resilience would be enormous, much of the expenditure would be offset by savings of losses that would otherwise have occurred due to climate impacts, and by other non-monetized co-benefits.<sup>88</sup>

Much adaptation action will be at state level, since land, water, agriculture, local urban and rural governance are all state subjects. Today, states are deprived of both finances and capabilities, and both will be required for the mammoth task ahead.

Actions on adaptation go to the heart of domestic equity. It is well known that climate vulnerability exacerbates pre-existing vulnerabilities, and marginalized, impoverished and under-served communities will need the most attention.

All this will call for more transformational thinking and action, by all actors. □

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