NDC ASPECTS

Country Report

Transition pathways for India

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Introduction and Overview

India is the world's most populous country, third largest country in terms of gross domestic product (GDP) by purchasing power parity (PPP) and the fifth largest economy by GDP (nominal). According to Climate Change Performance Index (CCPI) 2024, India ranks seventh and is on track to meet the benchmark of well below 2 degree C and show positive trend in the share of renewable energy.

In December 2022, the upper house of the Indian Parliament introduced 'Net Zero Emissions Bill' of 2022, which provides a legislative framework for India to achieve its Net Zero based on the updated Nationally Determined Contribution (NDC) under the United Nations Framework Convention on Climate Change (UNFCCC). The main goals in the updated NDC includes: (a) a further reduction of emission intensity of Indian GDP from 33 to 35% in its first NDC to 45% by 2030 based on 2005 level (existing target); (b) an increase in the share of non-fossil installed electric generation capacity from 40% to 50% (existing target); (c) to install 500 GW of non-fossil power generation capacity by 2030 (additional target); (d) to mitigate 1 billion tonnes of carbon dioxide equivalent (btCO2e)1 by 2030 (additional target); (e) the creation of a cumulative carbon sink of 2.5–3 btCO2e through additional forest and tree cover by 2030 (ongoing target); (f) Indian Railways to become net zero by 2030 (additional target); and (g) to become a net-zero emissions economy by 2070.

As a follow-up of the Glasgow declaration, India submitted its Long-term low carbon Development Strategies (LT-LEDS) to UNFCCC in 2022 at COP27. The LT-LEDS informed that to support India's demographic transitions, rural to urban and subsequent infrastructure transformations, energy is important to meet India's development needs and aspirations. India continues its efforts to decouple its emission s from economic growth by means of promoting low-carbon development in every sector. Mindful of the trade-offs and relating costs, India has recognized the co-benefits of integrating climate action in its development pathways in lieu of its national circumstances.

India's LT-LEDS is based upon an economy-wide multiple objectives approach, including integrating dimensions of gender equity and inclusion of marginalized and vulnerable groups, that consciously seeks to move to a low-carbon path of development. To become Aatmanirbhar Bharat (Self Reliant India), the document systematically outlines the current policies in electricity, industry (energy intensive and light industries), transport (passenger and freight), buildings (residential and commercial), agriculture and forestry sector. Development priorities of eradicating poverty and hunger, providing housing to all, increasing employment as well as income needs to be supported by financial aspects. The updated NDC includes push for energy storage and launch of green hydrogen policy for India. Estimated cumulative investments based on numerous sources range from 6-10 trillion USD between 2015 and 2030.

1. Long-term perspective: Key transformations to reach carbon neutrality

National trends

Under the long-term scenarios, the cumulative carbon emissions range between 100-145 billion tonnes (bt) of

carbon dioxide (CO2). Power, industry and transport sector are the source of largest emission in the CPS scenario, while the power and transport sector emission decline in the DDS scenarios.

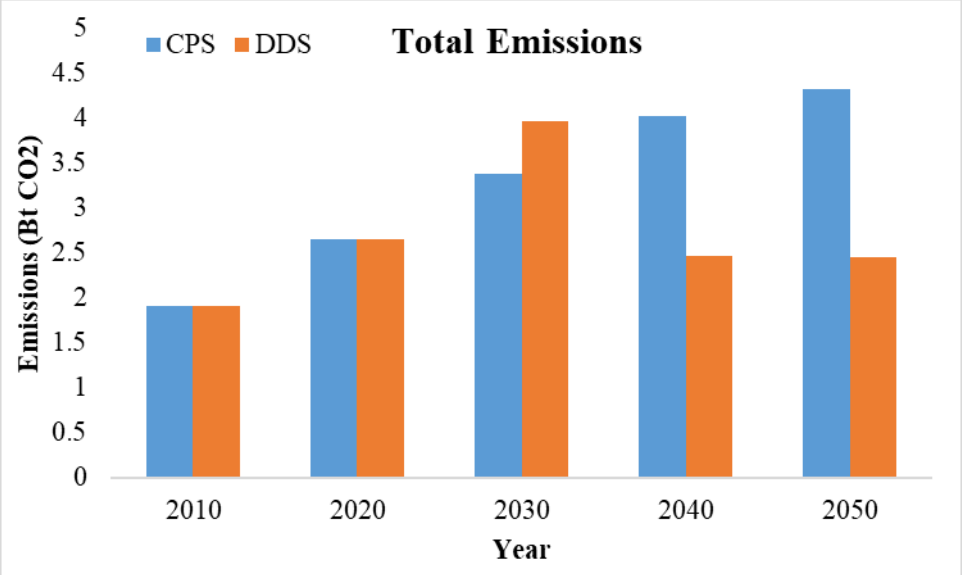

Figure 1: Total emissions from the economy
Source: NDC ASPECTS scenarios (India Study)

Key Transformations

The power sector projected decline in the share of electricity-related emissions. This is because that power generation is relatively easier to decarbonize when compared with other major emitting sectors (industries, transport), as many low- and zero-carbon technological options (e.g. solar PV, wind onshore, small hydro, waste to energy) are already cost-competitive with conventional fossil fuel thermal power plants.

On the other hand, emission reductions are more difficult to achieve in energy end use sectors (industry sector in this case) due to the lack of cheap low-emission alternatives and the lack of appropriate policy measures to accelerate the uptake of low-carbon options in these sectors. The effect of energy efficiency improvement in the electricity based end-use devices is observed indirectly in the power sector through reduction in electricity demand.

Transport sector observed major decline in both passenger and freight transport sector due to modal shift toward rail, heavy push towards electric vehicles in the passenger transport category (2 wheelers, 3 wheelers, 4 wheelers and buses).

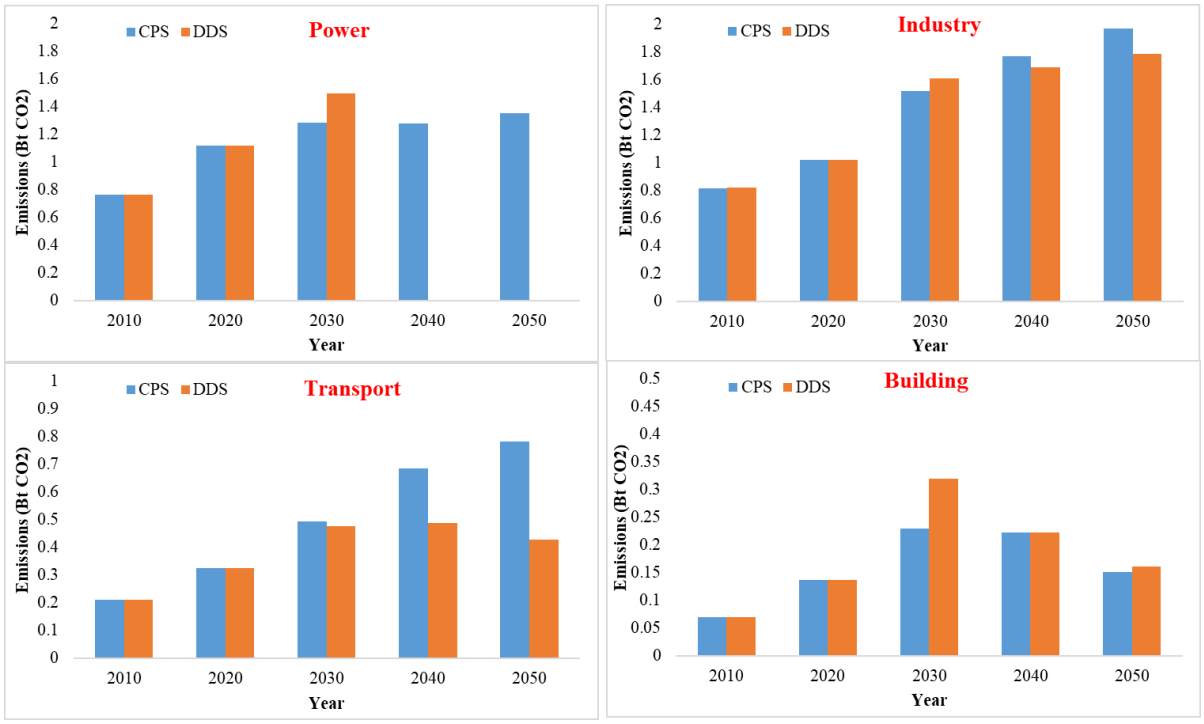

Figure 2: Sectoral Emissions under CPS and DDS pathways

Macroeconomic Impact

Investment requirements will increase based on industry transformations as well as lifestyle changes. India will require climate resilient structural changes to reduce the energy and carbon intensities of each of its energy intensive sectors.

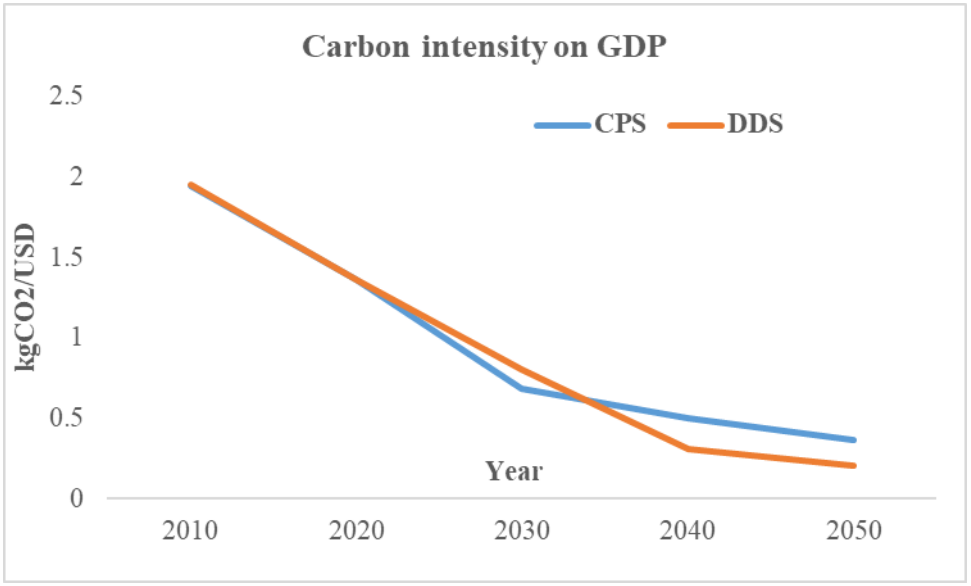

Figure 3: Carbon intensity of GDP under CPS and DDS scenarios

Social Aspirations

One of the key policy commitments that India introduced at COP26 which has now become a mass movement for "mindful and deliberate utilization, instead of mindless and destructive consumption" to protect and preserve the environment is LiFE (Lifestyle for environment). It aims to nudge individuals and communities to practice a lifestyle that is synchronous with nature and does not harm it. India is the first country to include LiFE in its NDC. Being the most populous country, it aspires to lead this effort. Lifestyle changes include shift in demand, supply and policy across the enduse sectors which includes about 30 actionable items in energy and AFOLU sectors. These will impact the decrease in emission after 2030.

2. Cooperation needs identified to accelerate climate action in the country

What needs for cooperation between national actors have you identified to reach the transformations?

Power sector needs to be net zero by 2060 for India to become net zero by 2070. Decarbonization of electricity sector is essential to move towards carbon-neutral India in DDS scenarios, as it subsequently impacts end-use sectors (transport, industry and building). So technically, central and state ministries and department related to power industry, transport and building need to coordinate efforts.

At the same time, the governments also require cooperation from private entities and civil societies to accelerate the efforts towards net zero in short, medium and long term. Climate related financial disclosures are critical to driving investments in capital intensive technology such nuclear, hydrogen and CCUS. The Task Force on Climate-related Financial Disclosures (TCFD) sets clear guidelines for such disclosures which should be made mandatory in accordance with international standards.

Have you identified where international cooperation would be key to put the country on the path to carbon neutrality and reach socio-economic priorities?

Bilateral and multilateral agreements for solar, wind, electric vehicles, stationary and mobile batteries, CCUS and hydrogen related technologies are required. Additionally, trade agreements need to support green industrialisation in developing countries like India.

As CCUS matures and the sector de-risks, commercial lenders may also become important financiers. An important component of low-cost finance for CCUS is in the form of outcome-based sustainability loans or sustainability linked loans. Under these mechanisms, proceeds may be borrowed for any activity, but the lending interest rates are lower if certain environmental, social, and governance criteria are being met. Green bonds could also be an important source of financing for CCUS. The capital-intensive nature of CCUS means that capital incentives would be an important part of policy interventions. For instance, to reduce revenue risks, it is important to have sequestration tax credits in addition to investment tax credits. The former could provide a higher incentive for CO2 that is not stored/utilized due to absence of market. These credits must be indexed to inflation.

Key messages for next NDCs

What 2030 emission levels are compatible with the country's carbon neutrality objective?

India's CO2 intensity of GDP is around 45-55% of its GDP and will meet its second NDC target by 2030. The CO2 intensity drops from 900g CO2/kWh in 2020 to 500g CO2/kWh in 2030.

What are the short-term key priority areas for action for each sector for the country to align with the carbon neutrality path?

In terms of renewable energy India has already tripled in capacity target in the second NDC, raised ambition by five times pre- NDC RE target of 100 GW in 2010. Similarly, solar targets have been increased since first NDC. Energy intensity is reduced in the industry sector. As industry transitions, electricity demand will rise. Building sector EE is considerable improved however as India will build infrastructure the total electricity demand will rise in the short term.

What socio-economic trade-offs and synergies have you identified?

Electricity is a developing country like India is required to be provide at affordable costs. In the short term, India will be dependent on coal for major energy use across power and industry sector, however transport will shift towards electricity. In the short term, for India the structural transformations and technical transitions (battery storage, EV and building infrastructure) need to be made cost-effective.

What are the policy packages that you have identified that are necessary to trigger action in key priority areas for action, while addressing the socio-economic trade-offs listed above? If relevant, please also consider consistency with existing or announced policies/decisions.

Solar, Wind technology and associated battery storage requires – resources (critical minerals). India requires to develop stronger national policies supporting domestic manufacturing to be competitive at global level.

All industry, transport and building policies needs to be supported by infrastructure policies that are climate resilient and supported by cost-effective, innovative climate finance mechanisms.

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