Net Zero

CoSci Press

Commentary

Panchamrit Under Scrutiny: Assessing India's Net-Zero 2070 Commitment

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Article History:

Received: 4 March 2026

Revised: 18 March 2026

Accepted: 8 May 2026

Published: 11 May 2026

Abstract: The article briefly comments on the "Net-Zero by 2070" ambition which India has promised at the COP 26. It assesses the feasibility of this target from technical and financial angle, and underscores some of the key underlying challenges, such as greenwashing. From a technical standpoint, article derives a practical challenge related to grid integration of renewable energy sources, utility of isolated microgrid setups, and the associated high capital requirements therein. Thereafter, the article draws a comparison between the promised budget allocation towards climate change related projects and the current standings of those projects. For facilitating the green financing, instruments like green bonds often get caught in the frame of greenwashing which acts yet another obstacle for achieving the 2070 target, and thus eventually leading to a conclusion which necessitates a practical and pragmatic approach to achieve the 2070 target.

Keywords: Net-Zero, Decarbonization, Greenwashing

1. Introduction

"In the midst of this global brainstorming on climate change, on behalf of India, I would like to present five nectar elements, Panchamrit, to deal with this challenge", said Hon'ble PM Modi, at COP 26, Glasgow in 2021. Achieving Net-Zero by 2070 was one of the elements proposed by the PM at the conference [1]. The statement was made at a time when India's installed solar power capacity was 110.73 gigawatts (GW) and wind power capacity was 51.23 GW [2], while on December 31, 2025 these figures stood at 135.8 GW and 54.5 GW respectively. The growth over 4 years is around 17% for these 2 major Renewable Energy Sources (RES) constituting 71.3 % total non fossil energy (including nuclear) in India. While Panchamrit proposes India aspiring to have 500 GW of non fossil by 2030, which shall require almost 87% growth over the next 5 years cumulatively from current levels [3], and that reasonably appears as a hard to conquer yet an interesting mission aboard considering a meagre 17% growth in last 4 years. This article describes the feasibility of India's net-zero ambition by analysing system level technical challenges, climate finance constraints, and the institutional risks of greenwashing, which act as yet another obstacle parallel to wide scale energy transitions to achieve the 2070 mission.

2. Technical Dimensions

The feasibility of India's net zero pathway hinges less on renewable capacity addition and more on system level integration challenges. As of late 2025, India's total installed power generation capacity reached approximately 514 GW, with nearly 49–50% of energy coming from non fossil fuel capacity. Of the total power portfolio, solar and wind combined constitute nearly 36% which need to be enhanced if the climate goals are to be achieved [4]. The power grid of India operates at 50 hertz (Hz) [5], and any alteration in frequency will invite disturbance in the grid and the disturbed zone might be isolated, causing a major disruption. Penetration of renewables with the main power grid poses major challenges with regard to stable

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https://doi.org/10.xxxx/xxxxx

grid frequency owing to intermittent nature of green power. For adequate grid integration, India requires robust grid integration mechanisms which is essentially a blend of power electronics and converters for direct current (DC) to alternating current (AC) conversion, thereby requiring a significant semiconductor supply for sufficient production of converters. More so, the buffer batteries associated with photovoltaic (PV) plants are primarily rare earth metal and mineral based, which indirectly pushes India into the aggressive expedition for these raw materials. In December 2025, Rajasthan faced 4.3 GW daytime curtailment of solar power due to lack of transmission infrastructure [6]. The problem by and large remains similar for wind power as well, which though inherently do not require DC to DC transmission but their specific locations pose a challenge for long range transmission. Solutions like Distributed RES aim to solve this problem by creating standalone power generation zones known as microgrids, however their cost investment at initial stages and maintenance efforts make this solution economically challenging for India to implement considering her vast and uneven geographical spread.

From a technical standpoint, there can broadly be three areas which require attention; First is structural capacity building for grid interfacing converters and battery energy storage systems (BESS); Second is to accelerate controlled non fossil energy sources, such as hydropower, biomass energy production and nuclear energy; Third is to boost the penetration of technologies such as carbon capture utilisation and storage (CCUS) particularly from "hard to abate" sectors [7] to ensure that existing carbon emissions are also being decimated from the environment. India's National Green Hydrogen Mission, launched in 2023 with a target of producing 5 million metric tonnes (MMT) of green hydrogen annually by 2030, adds another dimension to the technical agenda, as green hydrogen is considered pivotal for decarbonising hard to abate industrial sectors. On the demand side, energy efficiency improvements and demand side management measures—including energy performance standards and smart metering—are underutilised levers that can meaningfully reduce the quantum of new generation capacity required. Furthermore, just transition imperatives cannot be overlooked: India's coal sector employs over half a million workers directly, and the socio-economic challenges of redeploying these communities demand proactive planning alongside the technical buildout. A comparison with peer economies is instructive: China, which leads globally in renewable additions, has invested heavily in domestic supply chains for converters and BESS, enabling cost reductions that India is yet to replicate; Germany's Energiewende offers lessons on grid stabilisation through a combination of pumped hydro storage, demand response, and cross-border interconnections. India can draw on these experiences while tailoring solutions to its own federal structure and resource endowments.

3. Climate Financing & Greenwashing

According to Landscape of Green Finance in India by the Climate Policy Initiative (CPI), India will require United States Dollars (USD) 2.5 trillion by 2030 to meet its Nationally Determined Contributions and USD 10.1 trillion by 2070 to achieve Net-Zero. Conservatively, the current trends in climate finance represent less than 25% of what is required to meet the desired objectives [8]. Contemporarily, to finance the climate related projects, a mix of national and international commitments are in place but unfortunately, the contributions do not match with the promises made in the first place. Adaptation gap report at COP 30, Brazil underscored significant gaps to climate finance implying towards the requirement of USD 310 billion by 2035 for Least Developed Countries (LDC), which is 12 times the current flows [9]. Recent stance of USA to exit from climate ambitious global organizations point towards potential upcoming challenges for developing countries to fund the climate related projects [10]. For India to raise this magnitude of money, solely public finance initiatives will not stand substantial, and thus the prospects also need to be diverted to private financing. "Green Bonds" have received considerable attention as debt instruments for environment friendly projects, however their effectiveness has been limited. Within India, the absence of green taxonomies, standardization, and low financial incentives (called greenium) are some of the reasons for green bonds not being widely adopted as a financing instrument.

With green financing, emerges the issue of greenwashing. Measuring the results of nature friendly activities or projects can be challenging due to the underlying intangible nature of the outcomes therein, therefore greenwashing comes out as a pertinent challenge in the current climate finance landscape. The causal pathway from structural deficiencies in green financial instruments to corporate greenwashing behaviour is worth examining explicitly. When green taxonomies are absent or weakly defined, issuers face no binding obligation to demonstrate measurable environmental impact, lowering the bar for what qualifies as a "green" project. Simultaneously, a negligible greenium, i.e. the marginal yield advantage of green bonds over conventional bonds, reduces the financial incentive for rigorous compliance, making it easier for firms to raise

capital under a green label with minimal substantive commitment. The result is that weak standards and low costs of non-compliance structurally enable firms to overstate Environmental, Social and Governance (ESG) claims with limited accountability. Absence of standardization and weak oversight in green projects further mislead investors nominally supporting sustainable projects. Moreover, rising demand for sustainable products amplifies the practice of overstating ESG claims through vague terms like "eco-friendly", "natural" or "green", eventually resorting to greenwashing. The Bureau of Indian Standards (BIS) and other relevant governing bodies regulate certain eco labelling initiatives, but the effectiveness of these rules still allows companies to exploit gaps in enforcement. To address this situation, the government is implementing a new draft Climate Finance Taxonomy (2025) that classifies, identifies, and verifies projects contributing to net-zero goals, specifically aimed at reducing greenwashing [11]. The new taxonomy also encompasses hard to abate sectors like cement and steel, encouraging investment in transition activities instead of just purely green ones [12].

It can be concluded that India's Net-Zero goal by 2070 is a conditional ambition rather than an assured delivery. Solely the expansion of renewables won't suffice, instead a pragmatic approach addressing techno economic constraints, raw material and supply chain dependencies, financing gaps, and institutional reforms will determine the success of "Panchamrit". Several actionable priorities emerge from this analysis. On the technical front, India must invest in domestic manufacturing capabilities for grid-interfacing converters and BESS, reduce raw material import dependence through strategic mineral partnerships, and fast-track the expansion of controllable non fossil energy including nuclear and large hydropower to provide the grid stability that intermittent renewables alone cannot guarantee. On the financing side, bridging the climate finance gap will require a blend of policy reforms: operationalising the Climate Finance Taxonomy to unlock credible private investment, introducing meaningful greenium incentives to make green bonds commercially attractive, and strengthening multilateral commitments so that international pledges translate into actual disbursements. Institutionally, India needs robust mandatory ESG disclosure standards and an independent third-party verification mechanism to contain greenwashing and build investor confidence. Addressing the just transition dimension—retraining coal-dependent workforces and revitalising affected communities—is equally critical to ensure that the path to net-zero is socially equitable. The 2070 target remains achievable, but only if ambition is backed by integrated, time bound policy action across these dimensions.

4. Conclusion

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