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GS Paper II – Polity

'Records on caste census decision can't be disclosed'

Abhinay Lakshman

NEW DELHI

The Union government has stated that records of the Inter-Ministerial deliberations, inputs, and suggestions referred to in making the decision to enumerate caste in the 2027 Census are exempt from public disclosure under the Right to Information Act, 2005.

Responding to a request for these records filed by *The Hindu* under the RTI Act, the Union Cabinet Secretariat said that these records were exempt from disclosure under Section 8(1)(i) of the 2005 law. This section says the government is not obligated to disclose Cabinet papers, provided that "the matter is over" or "complete"; and provided that "the decisions of Council of Ministers, the reasons thereof, and the material on the basis of which the decisions were taken shall be made public after the decision has been taken".

On April 30, the Centre posted a statement, saying, "Cabinet Committee on Political Affairs has decided to include caste enumeration in the upcoming Census." On March 25, responding to requests for information on records relied upon for this decision, the Cabinet Secretariat said, "The information sought is exempted from disclosure under Section 8(1)(i) of the RTI Act."



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Centre's plan for women's reservation follows UPA blueprint for OBC quota

NEWS ANALYSIS

Varghese K. George

NEW DELHI

The Centre is proposing a 50% expansion in the size of the Lok Sabha and State Assemblies to accommodate 33% reservation for women ahead of the 2029 general election. The math is such that incumbent lawmakers will be assured that their pathway to seeking re-election will not be narrowed due to a new social accommodation.

Prime Minister Narendra Modi said during a campaign meeting in Kerala that assured representation for women would be achieved by creating additional seats. The government plans to increase the size of the Lok Sabha from 543 to 816 (a 50% increase in seats). There will be 273 additional seats, and 273, which is 33% of 816, will be reserved for women. The same math will apply at the State level too. For instance, Kerala will have its Lok Sabha seats increased



The late Arjun Singh designed the formula for OBC reservation in higher education.

from 20 to 30 with 10 seats reserved for women, Uttar Pradesh from 80 to 120, with 40 for women. The existing Scheduled Caste and Scheduled Tribe reservation of 15% and 7% each will have one-third of them reserved for women of respective groups.

Enlarging the size of the pie before carving out a new social accommodation is not unprecedented. It was exactly in this manner that the UPA-I government implemented reservation for Other Backward Classes (OBC) in higher education in 2005-06 and it was a formula designed by then Education Minister Arjun Singh. He cham-

pioned the expansion of reservation in higher education through the 93rd Constitutional Amendment Act and the Central Educational Institutions (Reservation in Admission) Act, 2006, that mandated a 27% reservation for OBCs in central higher educational institutions (such as IITs, IIMs, and Central universities). To accommodate this, the government implemented a 54% expansion of seats over a three-year period, starting from the 2008-09 academic session, ensuring the number of seats available for the general category did not decline.

'Win-win' formula

Until then, the SC and ST reservations added up to 22.5% of the seats, and the rest were general category seats. The proposal was to accommodate OBC reservation without impacting the absolute number of general seats. The math in that situation meant that the total capacity of Central higher education institutions had to expand by

54% for the general category numbers to remain the same. In the pre-OBC reservation era, general category had 78 seats out of each 100, which remained the same when the total grew to 154, of which 49.5% was reserved.

In other words, what was 78% of 100 earlier, became 50.5% of 154. This avoided any decline in the number of seats for general category students while accommodating the OBC students by expanding the pie. Singh defended the reservation policy as a win-win for all stakeholders, as investment in higher education expanded massively, with several new IITs, IIMs and AIIMS coming up, and the intake of students increasing by 54% for the bulging youth population of the country.

The BJP formula of linking additional seats in the Lok Sabha for women's reservation takes a leaf out of the Arjun Singh playbook. Expansion in seats in higher education was long overdue then, as it is for the legislatures now.



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'Opposition failed to provide proof of charges against CEC'

Sobhana K. Nair
NEW DELHI

Rajya Sabha Chairman C.P. Radhakrishnan and Lok Sabha Speaker Om Birla rejected notices moved by the Opposition MPs seeking the removal of Chief Election Commissioner (CEC) Gyanesh Kumar, holding that the Opposition failed to provide proof and the allegations levelled against him did not establish a *prima facie* case of "misbehaviour" as required under the Constitution.

A detailed 17-page order issued by the two presiding officers said the charges either lacked proof related to matters already adjudicated or were currently under judicial scrutiny. While the issues raised may be pertinent for political debate, the order noted that they did not meet the "high constitutional bar" necessary to initiate removal proceedings under Articles 324(5) and 124(4) of the Constitution or the Judges (Inquiry) Act, 1968.

The notices, submitted on March 12, were signed by 63 Rajya Sabha and 130 Lok Sabha members and contained seven charges against the CEC. Each charge was examined and rebutted in the order.

Dismissed charges

On the allegation that Mr. Kumar's appointment was "tainted" as the law governing his selection under the Chief Election Commissioner and Other Election Commissioners Act, 2023 was under challenge in the Supreme Court, the Chair said the pendency of a constitutional challenge did



Gyanesh Kumar

not amount to misbehaviour. The claim that Mr. Kumar's previous postings reflected "deep executive embeddedness" was also dismissed, with the order noting that several former CECs had similar administrative background without any presumption of bias.

Another charge, that the Election Commission applied different standards to the government and the Opposition, was rejected for lack of "clear demonstrable evidence" of abuse of authority.

Allegations that the commission obstructed investigations into alleged electoral fraud by refusing to share information with State authorities were also dismissed. Similarly, the refusal to provide machine-readable electoral rolls to political parties was held to be in compliance with Supreme Court directions.

Several charges related to the Special Intensive Revision (SIR) of electoral rolls in Bihar and its proposed nationwide expansion. The Chair observed that the EC has plenary powers under Article 324 and that the Supreme Court had considered the exercise and affirmed the commission's competence.

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Limits of neutrality in addressing caste

The interim stay by the Supreme Court on the UGC Promotion of Equity in Higher Education Institutions Regulation, 2026, as reported by the Supreme Court Observer, arrives at a pivotal moment. These regulations emerged from *Abeda Salim Tadvi v Union of India*, a pending case before the Supreme Court concerning caste-based discrimination and student suicides in higher educational institutions. The case highlights institutional failures in creating an equal and inclusive learning space.

When discussing caste discrimination in higher education, it is essential to clarify what is being addressed. The 2026 regulations under 3(c) define “caste-based discrimination” as discrimination based on caste or tribe against members of the Scheduled Castes, the Scheduled Tribes, and Other Backward Classes. This specificity is not exclusionary; rather, it is necessary to recognise caste as a continuing structure of marginalisation rather than isolated incidents.

Why neutrality fails

The definition has been criticised for excluding ‘general category’ students, with suggestions to adopt a caste-neutral definition that includes them, in line with Article 14 of the Constitution, which guarantees equality before the law. However, this reasoning misunderstands both how caste discrimination operates in practice and how equality is understood under the Constitution.

The Constitution does not mandate an abstract, one-size-fits-all neutrality. Article 15 not only prohibits discrimination but also empowers the State to make “special provisions” for socially and educationally backward classes, SCs and STs to ensure substantive equality. Equality, in this framework, is substantive rather than formal.



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The UGC guidelines must be supported by monitoring, regular audits, and meaningful oversight

Formal equality assumes that discrimination operates symmetrically and that all social groups require identical protection. However, caste discrimination is structural, embedded in graded hierarchies that shape access to dignity, resources, and institutional power. Including “general category” groups into a caste-neutral definition risks collapsing this structural inequality into a universal grievance framework, where systemic oppression is equated with isolated interpersonal bias. Such neutrality does not expand protection; it dilutes the law’s ability to address caste as a system of power.

For decades, SC and ST students have experienced social exclusion, unequal treatment, humiliation, and institutional bias. In several cases, such structural discrimination has led to mental distress and suicides. These realities, reflected in the pending case under which the equity regulations were formulated, show that the framework is grounded in systemic concerns, not isolated incidents.

A caste-neutral definition would flatten unequal social positions into a formal notion of sameness that the Constitution itself does not endorse. Articles 14 and 15 permit differential treatment precisely to remedy historical and social disadvantage. Treating caste-based oppression as symmetrical across groups disregards the hierarchies through which caste operates and shifts the focus away from structural exclusion to abstract individual grievances. Therefore, defining caste-based discrimination through historically marginalised groups is not arbitrary. It recognises that discrimination operates through power structures that advantage some while disadvantaging others. This is not “reverse discrimination,” but an acknowledgement that equality requires fairness in practice. A caste-neutral approach would obscure these structural

realities and weaken the law’s capacity to address caste-based exclusion in higher education.

Enforcement matters more

The equity regulations in higher education, including a focused definition of caste-based discrimination, are not meant to exclude others from protection. Rather, they aim to create a baseline of dignity and inclusion for those who have historically been excluded. This approach aligns with Articles 14 and 15, which allow differential treatment to remove disadvantage and achieve substantive equality. In a society shaped by caste, constitutional equality cannot be achieved through context-blind neutrality.

More importantly, the question is how effectively they may function on the ground. The failure to address caste-based discrimination lies largely in weak implementation and poor institutional accountability.

Instead of diluting the scope of the UGC regulations, the focus should be on strengthening them – by ensuring independent complaint mechanisms, time-bound inquiries, transparency in outcomes, and clear consequences for institutional non-compliance. The UGC guidelines must be supported by monitoring, regular audits, and meaningful oversight. A framework meant to prevent caste-based harm cannot succeed unless institutions are made answerable for how they respond to discrimination in practice.

Shifting the debate away from enforcement and towards abstract concerns about neutrality risks missing the core issue. For students facing everyday exclusion, the question is not inclusive definitional purity, but whether the system will respond when discrimination occurs. Strengthening the functioning of the UGC framework is therefore essential to fulfilling the constitutional promise of equality and dignity in higher education.



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GS Paper II – Polity

Delimitation, women's reservation, political dynamics

In September 2023, Parliament passed the Constitution (One Hundred and Sixth Amendment) Act, 2023, or the Nari Shakti Vandan Adhinyam, which commits to reserving one-third of seats in the Lok Sabha and Vidhan Sabhas for women, including in constituencies already earmarked for Scheduled Castes and Scheduled Tribes. However, this potentially transformative measure falls short of immediacy: its implementation is deferred until after the next Census and the subsequent delimitation exercise.

During parliamentary debates, the Congress party, along with several other Opposition parties, demanded its immediate operationalisation, ideally for the 2024 general election. Women's rights groups criticised the government for tying the quota to delimitation after the new Census, arguing that it creates unnecessary delays. The National Democratic Alliance (NDA) government rejected this, maintaining that such a major change, without updated Census data and delimitation, would undermine both fairness and feasibility.

The shift now seems more deliberate

Less than three years later, that position appears to have shifted. Recent reports suggest that the government now plans to amend the Women's Reservation Act, 2023 by initiating a delimitation exercise based on the 2011 Census, rather than waiting for a fresh Census and a subsequent delimitation process tied to it. At the same time, the size of the Lok Sabha and State Assemblies may be expanded by nearly 50%, increasing the Lok Sabha's strength from 543 to 816 seats. In the absence of any formal articulation of the basis for such an expansion, questions arise about its implications for representational balance and political fairness.

Taken together, these developments – particularly the proposed increase in seats – point to a decoupling of women's reservation from the next Census, expected to include caste enumeration beyond the Scheduled Castes and Scheduled Tribes, and the delimitation exercise that would follow. While this shift is framed as a means of expediting implementation, it also suggests a more deliberate political reconfiguration underlying these far-reaching structural changes.

The timing is telling. Acting at this juncture allows the government to claim credit for a long-pending reform that previous administrations failed to implement, even if it entails departing from the sequencing that it had earlier defended. It has clear electoral implications, likely to mobilise women voters in upcoming Assembly elections across key States/Union Territory, consolidate support ahead of the 2027 contests, and position the Bharatiya Janata Party as the party that delivered on women's reservations and gender justice. This claim could, in turn, become a chief plank of its campaign for the 2029 general election.



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Delimitation, however, remains contentious, questioning whether representation should be based solely on population or also consider economic, social, and demographic factors. A strictly population-based approach would strengthen the parliamentary power of northern States where fertility rates remain relatively high, while reducing the relative influence of southern and peninsular states that have stabilised population growth and significantly drive India's economy and employment. This dynamic is likely to deepen the existing north-south divide, driven by demographic asymmetries and uneven development outcomes, placing additional strain on the federal compact and the balance of inter-State representation.

These conflicting concerns stem from the constitutional freeze on delimitation, leaving constituency boundaries and seat allocations unchanged since the early 1970s. After nearly five decades, the government now appears set to lift this freeze, proposing a roughly 50% expansion of the Lok Sabha alongside proportional increases in State Assemblies. This approach is intended to reassure southern States by preserving their relative share of seats and thus reducing resistance to delimitation. Yet, even with a uniform expansion, the absolute seat counts of northern States would rise significantly, further tilting the existing balance of power in their favour. For instance, Uttar Pradesh and Bihar together could approach 180 seats, while the five southern States (Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Telangana) combined may reach around 195, raising the possibility that the northern bloc could still wield disproportionate political weight. In a first-past-the-post system, where numerical strength ultimately determines both electoral victory and seats gained, such an increase risks entrenching structural disadvantages for less populous regions, even if formal proportionality is preserved.

The issue of data

These distributional concerns are compounded by the question of data. Basing women's reservation on the 2011 Census is problematic, particularly when a new Census is already underway. India in 2026 bears little resemblance to its 2011 demographic profile: migration, rapid urbanisation, and the after-effects of the COVID-19 pandemic have significantly reshaped population patterns over the past decade and a half, altering both urban and rural constituencies. Proceeding with outdated data risks misrepresenting current realities at the very moment when foundational decisions on delimitation, seat expansion, and the operationalisation of women's reservation are being made. Yet, the urgency to move ahead suggests a calculated political judgement: that the imperative of delivering women's reservation will outweigh resistance, as few can afford to oppose its expeditious implementation, leaving little

room to contest either the process or its sequencing. The issue is further complicated by what the next Census itself may reveal. Widely expected to be a landmark exercise, the availability of caste data could sharpen demands for greater representation of disadvantaged caste groups, particularly given their demographic strength. It may also amplify calls for sub-quotas within women's reservation, especially from Other Backward Classes (OBCs), including Muslim OBC communities that remain underrepresented. Several political parties and women's organisations have already voiced such demands. By moving ahead without waiting for the 2026-27 Census, the government appears to be postponing these pressures, but only temporarily.

A further concern is the lack of clarity on how women's reservation will operate in practice. While the amendment mandates a one-third quota, it defers critical details, especially the rotation of reserved constituencies. This is not a minor issue: rotation determines who can contest, from where, and with what continuity, shaping both accountability and constituency development. Earlier proposals cautioned that frequent rotation could disrupt these goals, yet the current framework leaves the design unresolved. Reports suggest that in smaller States and Union Territories with one or two Lok Sabha seats, the rotation of reserved constituencies may operate differently, resulting in less frequent turnover, while in larger States, some seats could remain reserved across successive terms. However, the law itself provides only for rotation after delimitation, leaving the precise mechanism to be defined.

The need for deliberation

None of this diminishes the core premise: women's reservation is long overdue and politically imperative. Evidence from other countries suggests that quotas can be effective, and there is little reason to believe that India would be an exception. Taken together, women's reservation, seat expansion and delimitation are not isolated changes; they will jointly reshape who is represented, from where, and in what proportions. Seen in this context, they mark a foundational reordering of the electoral map – one that will redraw constituencies, recalibrate the weight of States, and reconfigure the social composition of legislative bodies. Far from a marginal or technical adjustment, this is a structural shift that could rebalance political power across regions, social groups, and genders.

Precisely because of the scale of this shift, implementation must be preceded by thorough deliberation grounded in the latest data. Departing from the logical and constitutionally settled sequence risks distorting representation and seat distribution, thereby weakening the very reform it seeks to advance. India stands on the cusp of one of the most significant transformations of its representative system since the early decades of the Republic.

Implementing women's reservation without waiting for the Census or delimitation exercise could undermine representation and the intended reforms



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GS Paper II – Polity

Strict definitions will suppress diversity in Hinduism: Centre to SC in Sabarimala case

Krishnadas Rajagopal

NEW DELHI

The Union government has told the Supreme Court that a straitjacket definition of what constitutes a “religious denomination” or which religious practices are “essential” would “compress” the inherently plural nature of Hinduism expressed through diverse sects, groups, spiritual lineages, regional traditions, faith, practices, rituals, customs, and beliefs.

The Centre has made its position clear ahead of the maiden hearing of a series of writ and review petitions linked to the Sabarimala temple case scheduled to be heard by a nine-judge Bench headed by Chief Justice of India Surya Kant from April 7. The nine-judge Bench would also look into the larger question of the extent to which courts could engage in core matters of faith.

The written submis-



A nine-judge Bench led by Chief Justice of India Surya Kant hearing the Sabarimala temple entry issue in New Delhi on Tuesday. ANI

sions of the Union government, represented by Solicitor-General Tushar Mehta, countered the September 2018 judgment of the Supreme Court which had held that devotees who visit the Sabarimala temple in Kerala were not a separate religious denomination called “Ayyappans” protected under Article 26 of the Constitution.

The five-judge Bench had dismissed the notion that the prohibition of women aged between 10 and 50 from entering the tem-

ple was an “ancient custom” of the religious denomination amounting to an “essential religious practice” protected under Article 25.

The 2018 judgment by a majority on the five-judge Bench concluded that there was “no identified group called ‘Ayyappans’”. Every Hindu devotee could visit the Sabarimala temple. The majority verdict in the Sabarimala case had concluded that the exclusion of menstruating women from Sabarimala tem-

ple was akin to treating them as the children of a “lesser God”.

The Centre said the restrictive approach of the 2018 judgment invaded intra-religious diversity. Matters of faith, belief, doctrine, practice, observance, symbolism and modes of spiritual life vary from community to community.

No written codes

Drawing inflexible rules to define religious denominations and establish essential religious practices would lead to confusing results especially in religions like Hinduism which are devoid of any mandatory written codes or canonical texts. “Denominations, sects and religions with no canonical texts, and which are open to change, would find it very difficult to establish any aspects of their beliefs, practices or culture to be essential,” the Centre submitted.



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GS Paper II – Polity

Women cannot be seen as ‘untouchables’ for 3 days a month: Justice Nagarathna

Krishnadas Rajagopal
NEW DELHI

Women cannot be treated as “untouchables” selectively for three days a month, the Supreme Court observed on Tuesday.

Justice B.V. Nagarathna’s remarks came against the backdrop of submissions referring to the erstwhile prohibition on menstruating women, barring them from entry into the Sabarimala temple. A 2018 judgment by the Supreme Court had lifted the prohibition on entry to the Kerala shrine by women in the years between menarche and menopause.

“Speaking as a woman, I can say there cannot be untouchability practised for three days every month, and no untouchability on the fourth day. Let us go by hard realities. Speaking as a woman, Article 17 (abolition of untouchability) cannot apply for three days and on the fourth day there is no untouchability,” Justice Nagarathna said while addressing the Union government, represented by Solicitor-

Solicitor-General, appearing for Centre said the prohibition was *sui generis* to Sabarimala shrine

General Tushar Mehta.

The Centre expressed strong reservations against the 2018 Sabarimala judgment that compared the bar on women’s entry into the temple to the practice of untouchability.

Mr. Mehta said the prohibition was not for three or four days, but was for an age group, adding that the prohibition was *sui generis* (unique) to the Sabarimala shrine. Other Lord Ayyappa temples, globally, were accessible to women of all ages, he said.

“There are denominational practices which we need to respect. Everything is not down to human dignity and autonomy... It is also about respecting the faith and tenets of a religion, not everything is about the taking away of dignity or bodily autonomy... Fundamental rights cannot be islands,” Mr. Mehta said.



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GS Paper II – Polity

Supreme Court begins review of 2018 Sabarimala judgment

Krishnadas Rajagopal

NEW DELHI

Justice B.V. Nagarathna, the sole woman judge in the Supreme Court and part of the Constitution Bench hearing a reference spurred by a 2018 judgment upholding the right of women of menstruating age to enter the Sabarimala shrine in Kerala, said on Tuesday that social ills cannot be branded and passed off as ‘essential religious practices’.

The Union government, which holds the position that the Sabarimala judgment was an intrusion into free exercise of religious freedoms and denominational rights, said the legislature, not courts, drives



reform in religion, if need be.

“If social evils are given a religious colour, then the courts can intervene to distinguish [between] the two,” Justice Nagarathna said.

Solicitor-General Tushar Mehta, who opened the arguments before the nine-judge Bench headed by Chief Justice of India Surya Kant, said the Preamble to the Constitution champions liberty of thought, expression, belief, faith, and worship.

The exchange marked the first day of hearing of a reference to evolve a ‘judicial policy’ for constitutional courts while dealing with questions of right to religious freedom enshrined in Article 25 and a denomination’s privilege to manage its own religious affairs under Article 26 of the Constitution.

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GS Paper III – Science & Technology

Energy from space



Q: What is space-based solar power?

A: The Shimizu Corporation in Japan has proposed a belt of power plants sitting along the moon's

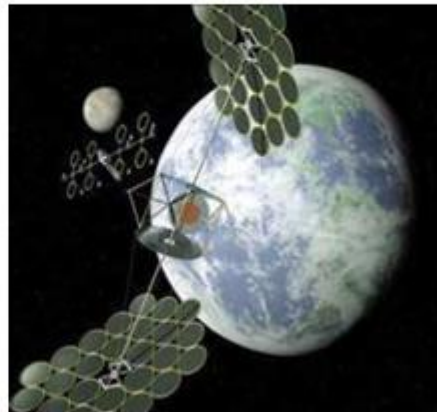
equator, which is 11,000 km long, called the "Lunar Ring". According to the company's plans, robots can build this mega-structure from lunar soil. The facilities will collect solar energy from the sun and beam it to the earth as microwaves.

If space-based solar power sounds like science fiction, it is exactly that. The concept involves launching large arrays of satellites to collect sunlight 24/7, and beaming the energy to the earth as microwave radiation. The corporation's plans are slightly different — they involve facilities on the lunar surface rather than in earth orbit — but otherwise involve the same physics.

Unfortunately for supporters of the idea, there are daunting hurdles.

The cost of space-based solar is staggering. Even if rocket launch prices drop significantly, engineers must still transport thousands of tonnes of hardware into orbit (or the moon). Building a single functional power plant is an unprecedented logistical feat. Once operational, the system must beam power through the atmosphere, a process that will lose significant energy as heat.

In orbit, a single collision with space debris could cripple a billion-dollar array, turning it into junk. Maintenance



A conceptual illustration of a satellite collecting solar energy in earth orbit and beaming it down as microwaves. NASA

will also be extremely expensive on the moon.

Terrestrial solar and battery storage are also getting cheaper and more efficient every year, making it hard to justify a complex and risky orbital or lunar facility. For now, space-based solar remains an idea trapped in poor economics.



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GS Paper III – Environment

On India's updated climate pledges

India's announcement of its revised Nationally Determined Contributions (NDCs) to the Paris Agreement prompts scrutiny of its existing climate mitigation actions and the need to factor in the country's developmental costs alongside those of meeting its climate commitments

FULL CONTEXT

T. Jayaraman

India's announcement of its revised Nationally Determined Contributions (NDCs) to the Paris Agreement – the term applied to the mitigation and other climate action targets that countries voluntarily commit to under the agreement – represents a considered step forward when India's energy and development policies are encountering serious headwinds. It is clear that the government has opted for continuity and incremental advance with respect to India's earlier NDCs. It is also clearly confident that its commitments will nevertheless be more than adequate in relation to its equitable share of global climate action, in keeping with climate justice and within its expected commitments as a developing nation.

Three climate goals

As the press communique after the Cabinet approval of the updated NDCs noted, there are three specific enhancements that have been committed. The first is an increase in the reduction of emissions intensity of its GDP, from 45% below 2005 levels by 2030 to 47% below 2005 levels by 2035. The second is ensuring that 60% of installed capacity for power generation is from non-fossil fuel sources, while the third is the enhancement of forest and tree cover carbon sinks to 3.5–4 billion tonnes of carbon dioxide equivalent above 2005 levels.

India's climate policies are best understood in the context of its structural constraints as a lower middle income developing country, that determine its available choices for climate action. Over the last three decades, those constraints have not substantially changed, which is also why India continues to insist on the relevance of the United Nations Framework Convention on Climate Change (UNFCCC). But apart from those, given the structure of the Paris Agreement that requires renewed and enhanced commitments to climate mitigation every five years, short-term considerations have also begun to have a considerable weight in the formulation of the NDCs. The rapid deterioration of the global environment for climate action over the last year has undoubtedly brought this issue to the fore.

Enthusiasm for climate action

Structural constraints have not, however, dampened enthusiasm for climate action in India, both at the level of the Centre and the State governments. There is a considerable range of activities designed to set India on the path to low-carbon development, drawing significant public and private sector efforts and resources, including electric vehicles, enhancement of energy efficiency, promotion and deployment of non-fossil fuel sources of electricity generation, new technologies such as green hydrogen and more recently, the active promotion of carbon capture and storage efforts.

But given India's developmental levels today, it is clearly premature for India to convert all such efforts into the significantly more onerous and accountable commitments that are the NDCs, the progress towards which is to be reported every two years in the Biennial Transparency Report (BTR) to the UNFCCC.

A section of global and domestic public opinion has raised the issue of the



A drone view of solar panels and the NTPC (National Thermal Power Corporation) power plant in Solapur, Maharashtra. [Source](#)

adequacy of India's NDCs relative to a global temperature goal of 1.5 degree warming above pre-industrial levels (the more ambitious part of the Paris Agreement's goal). Some have downplayed the new targets, one commentator going so far as to call it "a walk in the park". Others call for increased generation from renewables as the metric and not installed capacity. Even some sections of opinion that have welcomed the NDCs, appear nevertheless to be uncertain on whether these new commitments are genuinely the best that India can make at this time.

The cost of going green

All the above variants of the "India can (not) do more argument" ignore some critical realities that contextualise India's climate actions. Given that India's natural energy source is overwhelmingly coal, it is inaccurate to view improvements in emissions efficiency of GDP and the corresponding bending of its emissions trajectory as a "natural" corollary of India's growth story. Priority to electricity from renewable sources comes with significant costs, including backing down readily available and often cheaper or comparably priced coal-based thermal power, further tilting a playing field that privileges renewable energy to sustain our climate commitments.

Renewable energy (RE) projects including utility scale battery storage have begun to make their appearance in India's power sector. But the corresponding scaling up of India's battery storage capacity, required for ensuring the stability of generation even from the proposed 200 RE targets will run into a few trillion rupees at least. Part of such expansion would have to be funded by the government, deploying resources that would have been utilised in other sectors. At the very least, the deployment of such large-scale battery systems is not immediately feasible. The most globally

widespread option of energy storage in reverse pumped hydropower systems, has very limited scope in India at present. Additionally, environmental concerns, and water needs for competing uses such as irrigation, as well as the regulatory challenges faced by all large hydro projects are likely to preclude any rapid expansion.

Optimistic RE projections, not only in India but even globally, have run into the lack of transmission capacity and the challenges of grid balancing, with the associated costs often omitted when referring to the cost-effectiveness of RE power.

Since, for India, coal is the mainstay of power generation when solar and wind cease, unlike the large-scale gas and hydro available elsewhere, the full utilisation of the available RE capacity will inevitably have to be "curtailed", while adding to the operation and maintenance costs for thermal power operated in the cyclical fashion. These add further to the true cost that India bears for the pursuit of its climate commitments.

Improving energy efficiency in other sectors is also being pursued vigorously, including the introduction of mandatory emissions intensity targets in key industries. The early ramp up of electric vehicles, while the jump from BSIV to BSVI vehicle emissions standards was just coming into place, was another leapfrog moment, whose cost to the economy must not be underestimated. Since the 29th Conference of Parties of the United Nations Framework on Climate Change at Glasgow, every Central government budget has seen a range of initiatives and resource commitment across various aspects of climate mitigation. Indeed, a major knowledge gap today is that while future costs of increased mitigation action are routinely calculated, the cost burden attached to India's mitigation initiatives undertaken so far, in the absence of any significant climate finance, have yet to be

adequately accounted for in a reliable manner.

Accounting for India's developmental future

At a more over-arching level, India's mitigation challenge cannot be based on a simple extrapolation of the current structural features and trends of its economy.

India's developmental future needs room for further large-scale growth in manufacturing and industry, expansion in the provision of goods and services to its population at adequate levels beyond the minimum, and an urban transition that has only just begun. In this context, the "India can do more" arguments that rely on such extrapolations of economic trends and the persistence of current structural features, miss the urgent need to hedge India's developmental future.

India cannot commit its NDCs to preserving the Paris Agreement goal of limiting global temperature increase to 1.5 degrees above pre-industrial levels, when the goal is rapidly slipping out of reach. This is a trend that India cannot reverse, given that its per capita emissions are a third of the global average. Even otherwise, under the voluntary emissions reduction NDCs of the Paris Agreement, the benefits of India's reduction in emissions below any business-as-usual baseline, are distributed primarily to the big emitters globally, due to their inadequate efforts, and proportionately less to India, especially when the largest historical emitter has walked out of all climate treaties and seeks to dismantle climate action both at home and abroad.

India's climate commitments have to be strategic and circumspect, while its NDCs are formulated in informed self-awareness of its, to use the language of the Paris Agreement, "national circumstances."
(T. Jayaraman is with the National Institute of Advanced Studies, Bengaluru. Views expressed are personal.)

THE GIST

India's climate policies are best understood in the context of its structural constraints as a lower middle income developing country, which shape its choices for climate action.

The country has implemented several decarbonisation initiatives, including electric vehicles, deployment of non-fossil fuel power sources, and technologies such as green hydrogen.

However, India needs room for further large-scale growth in manufacturing and industry, which must be factored in alongside the future costs of its climate commitments.



GS Paper III – Science & Technology

Fast breeder nuclear reactor at Kalpakkam takes 'critical' leap forward

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Marking a significant step forward in India's nuclear power programme, Prime Minister Narendra Modi, via a post on social media platform X late on Monday said that the prototype fast breeder reactor (PFBR) at Kalpakkam, Chennai, had achieved "criticality". This means that the nuclear reaction in the reactor had become safely self-sustaining, and was on its way to being able to produce electricity.

"Today India takes a defining step in its civil nuclear journey advancing the second stage of its nuclear programme...the PFBR at Kalpakkam has attained criticality...it is a decisive step towards harnessing our vast thorium reserves," Mr. Modi posted.

While it will be some months before the PFBR is powered up to its full capacity, and even longer before it produces useful electricity, multiple experiments have to be conducted at low power to check if it's running as expected, which must be evaluated by the Atomic Energy Regulatory Board before it grants a go-ahead for commercial power operation, this the beginning of the second stage of India's nuclear programme.

Since it was first formally approved as a project by the government in 2003, the PFBR at Kalpakkam has taken over two decades to reach this stage.

PFBR as a bridge
India's nuclear reactors are heavily dependent on imported uranium. The country's three-stage programme, conceived in the

1950s, envisages being able to be independent of imported uranium, creating its own stockpile of suitable uranium, and eventually harnessing thorium, of which it has vast stores. The PFBR development serves as an essential bridge.

"This is a historic moment," Anil Kakodkar, Member, Atomic Energy Commission and former head of the Department of Atomic Energy, told *The Hindu*, adding, "What this means is that we are now on our way to extract 80-100 times more energy from a given quantity of uranium."

The PFBR is a 500 MW sodium-cooled, pool-type fast breeder reactor designed by the Indira Gandhi Centre for Atomic Research and built by Bharatiya Nabhikiya Vidyut Nigam Limited, both op-



Prime Minister Narendra Modi witnesses initiation of core loading of indigenous prototype fast breeder reactor at Kalpakkam. PTI

erating under the Department of Atomic Energy.

Uranium powerhouse
India's pressurised heavy water reactors (PHWR) burn up uranium to produce electricity and small quantities of plutonium. However, less than 1% of the energy from this uranium (that can be used as heat and make electricity)

is extracted from these reactors. The 'depleted' uranium in India isn't considered 'waste' but is reprocessed and stored. It, however, cannot be used back in the existing PHWRs.

"The PFBR reactor is designed to use the 'spent' uranium from the PHWR as well as produce more plutonium. We are no longer

using fresh, mined uranium here. As a thumb rule, this means that the 1% energy extracted can go up to nearly 10% for a single cycle and for every additional cycle 10% more. The efficiency of the uranium that is mined goes up substantially, Ravi Grover, Member, Atomic Energy Commission, told *The Hindu*.

"The burn-up or the energy extracted goes from about 8,000 units (in a PHWR) to nearly 100,000 units," Mr. Grover said.

Two more reactors
India's current plan, Mr. Grover said, was to construct two more PFBR at Kalpakkam, though this would only be following a proper assessment of the performance of the PFBR for a year. In the current scheme of things, the PFBR

will produce only "marginally more" plutonium.

"Our current priority is to use the uranium that we have far more efficiently. There is a reprocessing plant to come up on site at Kalpakkam which will use the processed spent fuel from the PFBR and for the two future PFBR. The PFBR will use depleted uranium (from the Pressurised Heavy Water Reactors or PHWRs).

In the future, we will use thorium, but that is still a long time away, and what kind of reactors we will use for that, we need more work and have to wait and watch," he said, adding, "These reactors are self-sustaining but as and when we need more plutonium in the future, the design has to be optimised to extract more plutonium."

Currently, India has a fleet of 18-20 PHWRs that

use natural uranium as fuel and produce plutonium-239 (Pu-239) as a by-product in spent fuel. India's full fleet of 23 nuclear reactors have a combined capacity of 7.48 GW. India hopes to have 100 GW by 2047 and this is premised on a larger fleet of Bharat Small Modular Reactors (which are scaled down PHWR) that are in the pipeline.

A significant technological challenge that has led to delays in the PFBR is the use of liquid sodium as a coolant to manage the extremely high heat from fissioning uranium atoms in the PFBR. In India's current reactors, the heat is largely absorbed by 'heavy water', or in some cases, ordinary water. Once fully operational, the PFBR is expected to generate 500 MW of electricity, with a design life of 40 years.