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Airline industry navigates turbulent skies amid safety fears and cost strain

As international carriers grapple with grounded fleets, aircraft delivery delays, jet fuel cost management, and tightening environmental targets, uncertainty over trade policies and regulatory oversight adds to the headwinds threatening the sector's fragile recovery and long-term sustainability

NEWS ANALYSIS

Aneesh Phadnis

Global airlines battling supply chain challenges and trade tensions are relying on data insights to optimise fuel burn and minimise the impact of tariffs on their operations.

A record 4.99 billion travellers are expected to fly, lifting global airline revenue and net profits in 2025, International Air Transport Association (IATA) said in its latest forecast at its annual general meeting in Delhi in June.

While the fall in jet fuel prices is aiding airlines, the uncertainty caused by U.S. tariff policies is dampening travel demand. Supply chain delays are also hurting airlines' plans to introduce new aircraft with better amenities and lower emissions.

Sustainability in the air Indian and overseas carriers are drawing up plans to make flying more sustainable by adopting new technology and reducing waste.

For instance, IndiGo has introduced an app for its pilots that leverages real-time data analytics and intelligent automation to monitor every phase of a flight. The app will provide actionable insights to pi-



Island in the sky: Air India said it is using the latest flight planning tools to select efficient flight routes, while also reducing wastage of food, material and energy. VELANKANNI RAJ B.

lots, leading to measurable improvements in operational performance and efficiency, the airline said.

Air India said it is using the latest flight planning tools to select efficient flight routes, while also reducing wastage of food, material and energy. It said 35% of its new crew uniform comprises recycled fabric. The airline has also tied up with the Indian Institute of Petroleum to develop local pathways for the production of sustainable aviation fuel (SAF).

Air India and Indian Oil Corporation (which is deploying a co-processing method to produce SAF at its Panipat plant) have also joined a global registry that tracks SAF purchases, usage and associated emis-



There is no time for delay and no tolerance for government greenwashing and unnecessary cost increases.

WILLIE WALSH
IATA director general

sion reductions in compliance with international norms.

International airlines are driving the change, too, with Brazilian low-cost airline GOL and TAP Air Portugal signing up as the first carriers to adopt IATA's advanced analytics solution to optimise fuel consumption.

"Fuel management is

key for airlines. Depending on the prevailing price of jet fuel, it generally accounts for 25-30% of the cost base. On top of that, as airlines decarbonise, tracking and managing costs – which are directly related to fuel consumption – will be a growing priority," said Nick Careen, IATA's senior vice president (operations, safety and security).

While technology and operational efficiency improvements are expected to account for around 10 per cent of total emissions reduction, SAF will account for around 65% as the aviation sector aspires to achieve its net zero target by 2050.

While airlines are doing their bit, IATA has blamed governments around the

world for not creating policy frameworks to meet emission goals.

Though global SAF production will double to two million tonnes in 2025 it will only meet 0.7% of airline fuel needs. (India has set a target to blend one per cent SAF with conventional jet fuel for international flights from 2027.)

"We have a quarter century to get to net zero. There is no time for delay and no tolerance for government greenwashing and unnecessary cost increases. We need urgent actions," IATA's director general Willie Walsh said in his AGM address.

Alongside non-availability of SAF, the ongoing supply chain disruptions and U.S. trade policies are matters of concern for airline bosses.

IATA estimates that airlines in from North America will generate the highest absolute profit among all regions but they may be affected by a slowdown in the U.S. economy, as rising tariffs are likely to erode both consumer and business sentiment.

Change in travel plans

The impact is already visible with economy-class demand cooling off on the U.S.-India routes due to tighter visa policies.

Joanna Geraghty, CEO of U.S. carrier JetBlue, said the volatility around tariffs and recent safety incidents

were creating uncertainty. "Consumers are confident of taking one vacation but perhaps rethinking that second vacation out of concern over tariff volatility," she said.

After an initial softness, FedEx is seeing resumption of trade as the U.S. government lowered the reciprocal tariff imposed on various countries. The company is using data and digital tools to help customers manage the frequent changes in tariffs.

"We have a vast amount of classification data of all commodities getting into the U.S. We are using the data to help especially the smaller customers with better trade classification tools to smoothen the entry filing processes," Richard Smith, chief operating officer (international), FedEx, said.

Meanwhile, supply chain constraints continue to hinder aviation growth. While some airlines have seen a reduction in grounded aircraft (40 from around 70 six months ago), overall the industry situation remains grim.

Walsh said the current global aircraft delivery backlog is 17,000, implying a 14-year wait between order and delivery. The number of deliveries scheduled for 2025 is 26% lower than what was promised a year ago, he said.

(The writer is with The Hindu businessline)



Why have special economic zones rules been relaxed?

Have these relaxed rules encouraged investment in the domestic manufacture of semiconductors? How important are semiconductors to the digital ecosystem?

T.C.A Sharad Raghavan

The story so far:

The Government of India has been taking various steps to boost the production of semiconductors and electronics in India, in a bid to reduce our dependence on imports. Some previous measures include the Semicon India programme launched in 2022 with an outlay of ₹76,000 crore. Now, the government has gone a step further and has relaxed key rules related to Special Economic Zones (SEZs) to further encourage the domestic manufacture of semiconductors and electronics.

Why are semiconductors important?

Semiconductors lie at the heart of an increasingly electronic society, with AI and machine learning only the latest in a long trend of increased digitisation and

automation. Semiconductors are the tiny chips processing vast amounts of information that make all of these processes possible, in one's phone, computer, tablet, smart TV, smart speaker, car, and every other electronic gadget. According to the Semiconductor Industry Association, China accounted for about 35% of all semiconductors manufactured in the world in 2021. Following the COVID-19 pandemic, much of the world, including India, realised that the concentration of supply chains in one country posed huge risks for any country dependent on those supplies. Therefore, they started trying to boost the domestic manufacture of such key components.

What are the latest steps by the Indian government?

On June 9, the Ministry of Commerce and Industry announced that it had notified several modifications to the Special

Economic Zones (SEZ) Rules, 2006, a week earlier, to enhance the domestic manufacture of semiconductors.

One of these tweaks was to Rule 5, which dealt with the size of the SEZ. Earlier, an SEZ set up exclusively for the manufacture of semiconductors or electronic components needed a minimum contiguous land area of 50 hectares. This has now been significantly reduced to 10 hectares. This reduced size will allow companies to make smaller investments but still avail of SEZ benefits such as tax exemptions, duty-free imports, and infrastructure support.

Another amendment to Rule 7 of the SEZ Rules now allows the Board of Approval for SEZs to relax the condition that had required SEZ land to be "encumbrance-free". Land is deemed to be encumbrance-free if it does not have any legal claims, liens, or charges against it, and when clear title of ownership and

transfer can be established. With India's complicated and often-archaic land record mechanisms, and lengthy legal processes, such a requirement would have stymied a lot of SEZs. Relaxing this rule will allow SEZs to come up faster.

A third amendment was to Rule 18, allowing SEZ units in semiconductor and electronics component manufacturing to supply domestically, after paying the applicable duties. Conventionally, SEZs are exclusively export-oriented. Allowing domestic sales not only shields the SEZs from the ongoing global trade uncertainty, but also ensures a steady supply to the domestic market itself.

What has been the impact?

Given the changes are so recent, one can't immediately establish long-term impacts. However, following the tweaks, two new SEZs have already been approved with a total investment of ₹13,100 crore. Micron Semiconductor Technology India will establish an SEZ facility in Sanand, Gujarat for the manufacture of semiconductors with an estimated investment of ₹13,000 crore, while Hubballi Durable Goods Cluster, a part of the Aegus Group, will establish an SEZ facility for the manufacture of electronic components in Dharwad, Karnataka, at a cost of ₹100 crore.

Micron's plant is to be 37.64 hectares in area and the Aegus plant is expected to be 11.55 hectares.

THE GIST

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What are flue gas desulphurisation units?

What are the different types of FGD systems commonly used in coal-fired thermal power plants? Why are emissions of sulphur dioxide a threat to the planet? Why is the government advocating for a rollback of FGDs in coal-fired power plants? What are the alternatives?

EXPLAINER

Priyali Prakash

The story so far:

On June 4, *The Hindu* reported that a committee of experts, chaired by Principal Scientific Advisor (PSA) Ajay Sood, has recommended that India do away with a decade-long policy of mandating Flue Gas Desulphurisation (FGD) units in all coal-fired thermal power plants (TPPs).

What is a FGD unit?

Flue gas is emitted as a byproduct of combustion of fossil fuels. It mainly contains pollutants such as carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides, particulate matter, etc. FGD units specifically target the SO₂ emissions in flue gas. SO₂ is an acidic gas, and is usually treated with a basic compound in the FGD unit to neutralise the pollutant. There are three common types of FGD systems around the world – dry sorbent injection, wet limestone treatment, and using sea water to remove SO₂. The dry sorbent injection method involves adding a powdered sorbent like limestone to the flue gas, where it reacts with SO₂. The resultant compound can be removed by using an electrostatic precipitator, or a fabric filter. The wet limestone treatment method also uses limestone to remove SO₂, but instead of using it in a powdered form, it uses a limestone slurry. Passing SO₂ through this slurry results in the formation of gypsum, which is a stable compound and has wide applications in industries like construction. This is the commonly used technology, and has very high efficiency.

Sea water treatment is used in plants located near coastal areas. Sea water first absorbs SO₂ from flue gas, and then the water is treated to make it suitable to be discharged back into the sea.

Why are SO₂ emissions bad?

SO₂ is one of the major greenhouse gases



Costly cleanup: Smoke comes out from the Tuticorin Thermal Power station in Thoothukudi. FILE PHOTO

that cause global warming, and can cause respiratory problems in humans. Sulphur dioxide can also lead to the formation of other oxides of sulphur in the atmosphere, which can in turn react with other compounds to form particulate matter. "It has been established in several modelling studies that 15% of India's ambient PM_{2.5} is attributable to coal. A significant share of this (80%) is in turn attributable to secondary particulate matter formed from the SO₂ that is released when coal is burned. FGDs are absolutely necessary to mitigate this route to PM_{2.5} formation," Karthik Ganesan, Fellow and Director - Strategic Partnerships, Council on Energy, Environment and Water told *The Hindu*.

What's status of FGD units in India? In 2015, the Union Environment Ministry issued a policy that mandated all 537 coal-fired TPPs in India to install FGD units to reduce SO₂ emissions. The first

deadline for this was 2018, but merely a handful of the plants met the deadline. As of April 2025, compliance had been pushed to 2027, 2028, and 2029, respectively, depending on the category of the thermal power plant. It takes around two years to install an FGD unit.

According to a government press release dated August 1, 2024, FGD units have been installed in only 39 out of 537 coal-fired TPPs in India. On December 30, 2024, the Ministry of Environment, Forest and Climate Change (MoEFCC) issued a notification, pushing back the deadline for complying with SO₂ emission norms by three years without specifying any reasons. In April 2025, a study commissioned by the PSA's office concluded that the Environment Ministry should roll back its 2015 policy mandating all of India's TPPs to install FGD units.

Why are FGD units contentious? Installing FGD units is a costly affair.

According to the Central Electricity Authority, FGD costs approximately ₹1.2 crore per MW to install. As of April 2025, India's installed coal capacity stood at 219,338 MW, which is more than 46% of the country's total electricity installed capacity. This is expected to rise in the coming years. In his statement at a June 10 press conference, Union Power Minister Manohar Lal Khattar said, "About 97,000 MW of power will be added, and implementing FGD means an additional expense of ₹97,000 crore. We have to consider this carefully. Neither should health be harmed, nor people face increased tariffs, nor warming increase."

However, some researchers like Shruti Sharma, Lead, Affordable Energy, at the International Institute for Sustainable Development, Bengaluru, believe that even though "skipping FGD units may appear to offer short-term savings, it risks undermining India's clean air targets and public health commitments". "FGDs can add up to ₹0.72 per kWh to electricity tariffs – a cost that reflects the price of cleaner air. Importantly, over 80% of this increase in tariffs is due to the FGD technology's fixed costs, and variable cost increase is in all cases less than ₹0.1 per kWh. This limits the risk of volatile or unexpected costs and makes it easier for utilities and regulators to plan and manage the impact," she said. It's also tricky to gauge how FGDs make an impact on air quality, since it depends on the proximity of towns to power plants. "The contribution to PM_{2.5} in Delhi, for example, is not that significant from coal-based power plants but given the levels that Delhi experiences, many sources have to be addressed, and stationary sources are easier to target," Dr. Ganesan said.

Is there an alternative to FGD?

According to experts, no. "There is no alternative to FGDs itself to remove SO₂ that is released from the burning of coal... There is an urgent need to get these [TPPs] compliant without delaying any further," Dr. Ganesan said.

THE GIST

Flue gas is emitted as a byproduct of combustion of fossil fuels. It mainly contains pollutants such as carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxides, particulate matter, etc.

SO₂ is one of the major greenhouse gases that cause global warming, and can cause respiratory problems in humans.

Installing FGD units is a costly affair. According to the Central Electricity Authority, FGD costs approximately ₹1.2 crore per MW to install.



Mind the gap

India needs to ensure women's participation in policymaking

India has dropped two points from its position last year in the World Economic Forum's Global Gender Gap Index report, holding at 131 out of 148 countries. The parity score is just 64.1%, making it among one of the lowest-ranked countries in South Asia, according to the report released last week. The Index measures gender parity in a country across four aspects – economic participation and opportunity; educational attainment; health and survival, and political empowerment. While the performance of India in three of the four dimensions is either stable or has marginally improved, the significant lack of achievement in the fourth weighs down the overall result. The report says, in the economic participation and opportunity category, India has improved by +0.9 percentage points. The parity in estimated earned income rises from 28.6% to 29.9%, positively impacting the subindex score, the report said. Scores in labour force participation rate remained the same (45.9%) as last year – India's highest achieved to date. In the educational attainment and health and survival categories, the scores have been driven up by positive shifts. It is in the political empowerment category that India records a drop in parity, since the last evaluation. Female representation in Parliament fell from 14.7% to 13.8% in 2025, lowering the indicator score for the second year in a row below 2023 levels. Also evaluated was the share of women in ministerial roles, which fell from 6.5% to 5.6 %, continuing the sinking trend since 2023.

The path ahead is obvious – consolidate and improve on the gains and make efforts to set right the lacunae with policies and political will. India has had a long, shameful tussle on this issue as it toyed with the idea of increasing representation for women in polity. The controversial Women's Reservation Bill was passed in 2023, 27 years after it was first introduced in 1996. The Bill has been visited upon by many charades, was blocked at every turn, and the path to actualisation of the goal was lined with monumental impediments. The present Act reserves one third of the seats for women in Parliament and the State legislatures, but will only be implemented from 2029, after the completion of the Census, and the delimitation exercise. But India climbing up the ranks of a global index should be only secondary to achieving a rounded, applause-worthy, gender parity structure within the country. There is, also, nothing keeping political parties from increasing women's participation in the electoral process, even before the law necessitates it.



Fire on waters

India's maritime firefighting capabilities are standing up to the test

The Indian coast needs to be protected against three types of major peacetime maritime accidents involving merchant ships: sinking of merchant ships, causing the loss of cargo, disruption of maritime traffic, and environmental damage; fire onboard merchant vessels that can seriously threaten not just the environment but also life and property on the coast; and oil spills. The recent fire onboard *MV Wan Hai 503*, that started with explosions when the ship was some 44 nautical miles off the Azhikkal coast in Kannur, Kerala, on June 9, has been successfully controlled now. Photographs of the ship showed a cocktail of smoke of brown, white, grey and black colours billowing out, indicating that many substances were burning. The cargo manifest showed that more than 140 of the 1,754 containers had various types of hazardous cargo. Coast Guard officials report that the raging *Wan Hai* had started drifting dangerously towards the coast even as firefighting was on and the sea remained rough under monsoon conditions. A tow rope was passed onto the ship but it snapped. An Indian Navy helicopter flew in to airdrop a salvage team and pass a wire rope that was made of steel, which was then used to tow the ship 45 nautical miles away from the coast where the depth is nearly one kilometre. The owner of the vessel pitched in by commandeering tugs through their agents. *Wan Hai* does not pose an immediate danger to the Indian coast now. Smoke is still seen from the ship and there are hot spots, but it is now up to the ship owner to salvage the vessel after completely putting out the fire.

Most of the patrol vessels, the workhorse of the Coast Guard, are now fitted with firefighting equipment since firefighting is a key mandate of the agency. While hazardous cargo on containers are indeed a major fire hazard, a more severe fire hazard is oil. Gas-carrying merchant ships are perhaps the greatest fire and explosion hazards. Nightmare scenarios that can bring the world to its knees involve gas carrier accidents at choke points such as the Suez Canal or the Strait of Malacca off Singapore. In 2020, the Indian Coast Guard and Navy successfully put out a massive fire that broke out off Colombo on the Very Large Crude Carrier (VLCC), *New Diamond*, chartered by the Indian Oil Corporation. The VLCC was carrying 2,70,000 tonnes of crude oil and bound for Paradip in Odisha. That these ships were structurally intact despite week-long infernos is a testament as much to the maritime firefighting capabilities of India as the advanced design, materials and construction of the ships. Quick salvage of sunk ships and fighting oil spills, which require quick, extensive and close multi-agency coordination, are the other areas where India needs to build and demonstrate more expertise.





India has long been the world's go-to supplier for generic drugs, but as AI sweeps through the global life sciences industry, there's a sense something much bigger is in the works. REUTERS

AI and biomanufacturing: can the policies match our ambitions?

When an AI model is used to control a bioreactor, how do we know that it's reliable? Who checks that the data it was trained on is representative of India's diverse conditions, or that it won't make a catastrophic error if something unexpected happens? These are matters of public trust and safety

Deepakshi Kasat

India stands at a pivotal juncture in its quest to harness artificial intelligence (AI) for biotechnology innovation. On one hand, initiatives like the BioE3 Policy and the IndiaAI Mission reflect a bold vision to position the country as a global leader in AI-driven biomanufacturing and ethical AI development. On the other, fragmented regulations and lagging safeguards threaten to undermine this progress. As India races to capitalise on AI's transformative potential, a critical question emerges: can it balance ambition with accountability? India's biomanufacturing sector is abuzz with possibilities. For decades, the country has been the world's go-to supplier for generic medicines and vaccines, a reputation it has built on scale, cost, and reliability. But now, as AI sweeps through the global life sciences industry, there's a sense that something much bigger is in the works. Many modern biomanufacturing facilities already have robots running precision tasks, biosensors streaming real-time data, and AI models quietly optimising everything from fermentation to packaging.

DNA of biomanufacturing Biocon, one of India's largest biotechnology firms, is integrating AI to improve drug screening and its biologics manufacturing processes. By leveraging AI-based predictive analytics, Biocon will enhance the efficiency of fermentation and quality control, reducing production costs while maintaining global standards. Similarly, Bangalore-based Strand Life Sciences uses AI in genomics and personalised medicine, helping accelerate drug discovery and clinical diagnostics. Their platforms use machine learning to analyse complex biological data, making it easier to identify drug targets and predict treatment responses. These efforts illustrate how AI is already reshaping biomanufacturing and healthcare delivery in India.

It's not just about swapping out people for machines. AI is transforming the very DNA of biomanufacturing. Imagine a production line where sensors feed thousands of data points every second into an AI system that can spot the faintest hint of trouble, like a temperature drift, a pH blip or a subtle change in cell growth. Before a human operator even notices, the AI predicts a deviation, tweaks the process, and keeps the batch on track. Digital twins, which are virtual replicas of entire manufacturing plants allow engineers to run simulations, test changes, and foresee problems without ever touching a real fermenter.

The result? Fewer failed batches, less waste, and products that consistently meet the gold standard for quality. For a

country like India, where every rupee and every dose counts, these gains can be transformative.

Interesting and complicated

The Government of India has clearly recognised this potential. The BioE3 Policy, rolled out in 2024, is a playbook for the future. The policy lays out plans for state-of-the-art biomanufacturing hubs, biofoundries, and "Bio-AI Hubs" that will bring together the best minds in science, engineering, and data. There's real money on the table too, with funding and grants designed to help startups and established players alike leap from the lab bench to the market shelf.

Equally important is the IndiaAI Mission, which is working alongside BioE3 to ensure India's AI revolution is both innovative and ethical. The Mission is as much about building technical capacity as about building trust. By supporting projects that focus on explainable and responsible AI – such as efforts to reduce algorithmic bias or frameworks for "machine unlearning" – the Mission is helping set the standards for how AI should be developed and deployed in sensitive sectors like health and biotechnology.

But here's where things get interesting and complicated. While India's ambitions are sky-high, its regulatory framework is still catching its breath. The rules that govern how new drugs, biologics, and manufacturing processes come to market were written for a different era. Today's AI-driven systems don't always fit neatly into those boxes. For example, when an AI model is used to control a bioreactor or predict the yield of a vaccine batch, how do we know it's reliable? Who checks that the data it was trained on is representative of India's diverse conditions, or that it won't make a catastrophic error if something unexpected happens? These aren't just technical questions. They are matters of public trust and safety.

Risk-based, context-aware

Globally, the rules are changing. The European Union's AI Act, effective since August 2024, classifies AI tools into four risk tiers. High-risk applications like genetic editing face strict audits while the U.S. FDA's 2025 guidance mandates a seven-step framework for AI credibility. These models emphasise two things India lacks: context-specific risk evaluation and adaptive regulation. For instance, the FDA's 'Predefined Change Control Plans' allow iterative AI updates that are critical for evolving cancer therapies without compromising safety. India needs this kind of risk-based, context-aware oversight as it moves from pilot projects to full-scale, AI-powered manufacturing.

Picture an Indian biotech startup that develops an AI platform to optimise enzyme production for the specialty

chemicals industry. This sector is already worth \$32 billion (₹2.74 lakh crore) and growing fast. If this AI is trained only on data from large, urban manufacturing sites, it might fail to account for the quirks of smaller plants in semi-urban or rural areas, like differences in water quality, ambient temperature or even local power fluctuations.

Without clear standards for dataset diversity and model validation, the tool could recommend process tweaks that work beautifully in Bengaluru but flop in Baddi. The result: lost revenue, wasted resources, and a blow to India's reputation for quality. This is why the context of use and credibility assessment that are core pillars in the FDA's approach are so important. We need to be clear exactly what question the AI is answering, how it's being used, and how strict our oversight should be, depending on the risks involved.

Of course, biomanufacturing is only one piece of the puzzle. Imagine a future where India not only supplies 60% of the world's vaccines but also designs them using algorithms that predict viral mutations. A future where farmers in Bihar receive AI-generated advisories to combat pest outbreaks and patients in rural Tamil Nadu are diagnosed by tools trained on India's genetic diversity. This isn't science fiction – it's the promise of AI-driven biomanufacturing, a field where India is making bold strides. Yet beneath this optimism lies a critical question: can our policies keep up with science?

With great power comes...

The intersections are multiplying. In drug discovery, AI platforms can screen millions of compounds *in silico*, slashing the time and cost needed to find new treatments. Molecular design tools are helping researchers fine-tune drug candidates for maximum efficacy and minimal side effects. Clinical trials that were once notorious for delays and inefficiencies are being streamlined by AI systems that optimise patient recruitment and trial design, making studies faster and more representative. Even the supply chain is getting an upgrade. AI-powered predictive maintenance keeps manufacturing lines humming, while demand forecasting ensures that medicines reach the right place at the right time, reducing shortages and waste.

Another unique application of AI is Wipro's work in developing AI-powered solutions for pharmaceutical companies to streamline drug discovery. By combining machine learning algorithms with computational biology, Wipro has helped reduce the time required to identify viable drug candidates. Similarly, Tata Consultancy Services is leveraging AI in its 'Advanced Drug Development' platform, which uses machine learning to fine-tune clinical trials and predict treatment outcomes. These applications

As AI begins to play a bigger role in inventing new molecules and processes, questions about inventorship, data ownership, and licensing are becoming more urgent. Without clear, harmonised policies, the risk of stifling innovation or ending up in costly legal battles persists

demonstrate how AI is not just confined to manufacturing but is transforming the entire healthcare value chain, from research to patient care. These innovations also indicate India's potential to lead the way in AI-powered healthcare solutions.

But with great power comes great responsibility and a host of new challenges. Data governance is a big one. AI models are only as good as the data they're trained on, and in a country as diverse as India, that's no small feat. The Digital Personal Data Protection Act 2023 is a start, but it doesn't address the specific needs of AI in biomanufacturing, like ensuring that datasets are clean, diverse, and free from hidden biases. Intellectual property is another thorny issue. As AI begins to play a bigger role in inventing new molecules and processes, questions about inventorship, data ownership, and licensing are becoming more urgent. Without clear, harmonised policies, the risk of stifling innovation or ending up in costly legal battles persists.

Create, not just copy

So, what's the way forward? First, India needs to move quickly towards a risk-based, adaptive regulatory framework. This means defining the context of use for every AI tool, setting clear standards for data quality and model validation, and ensuring ongoing oversight as systems evolve.

Second, India needs to invest in infrastructure and talent – and not just in the metropolitan cities but across the country.

Third, it needs to foster a culture of collaboration, bringing together regulators, industry, academia, and international partners to share best practices and solve problems together.

If the country gets this right, the rewards are enormous. India's legacy in generic drug manufacturing is secure but the future belongs to those who can harness the power of AI to create, not just copy. With the right policies, the right people, and the right priorities, there's no reason why the next great leap in biomanufacturing shouldn't come from India. The world is watching and the time to act is now.

(Deepakshi Kasat is a scientist with GlaxoSmithKline in California. deepakshikasat@gmail.com)

India will continue efforts to strengthen ties with Cyprus: PM

Both nations to hold delegation-level talks today; Modi says visit will add significant momentum to bilateral trade and investment relations

Kallol Bhattacharjee
NEW DELHI

India will move ahead with its plans to strengthen ties with Cyprus, said Prime Minister Narendra Modi in Nicosia where he arrived Sunday evening.

Mr. Modi was greeted by Cyprus President Nikos Christodoulides at the airport. He met the resident Indian community in the island nation, which has been supportive of India's position on the Kashmir issue and has most recently expressed solidarity with India after the terror attack in Pahalgam in April.

"This visit will add significant momentum to India-Cyprus relations, especially in areas such as trade, investment and more," Mr. Modi said on arrival.

"I thank the Indian community for the love. India will continue its efforts to strengthen its ties with Cyprus in the future," said Mr. Modi after meeting the Indian community.



Closer ties: Prime Minister Narendra Modi being received by Cyprus President Nikos Christodoulides at the airport on Sunday. ANI

Following the welcome ceremony and the meeting with the resident Indians, Mr. Modi attended a Cyprus-India Roundtable Discussion organised by the Cyprus Chamber of Commerce and Industry.

The visit, which is significant for India as it sends a message to neighbouring Turkey, coincided with the Israel-Iran conflict.

As the airspaces over Iran, Lebanon and Israel were closed owing to the conflict, Mr. Modi's official aircraft flew over

the Arabian Sea, Somalia, Ethiopia, Eritrea, and Egypt before arriving at Cyprus.

The ceremonial welcome for Mr. Modi is scheduled for Monday when the two leaderships will sit for restricted talks as well as for delegation-level talks that will be followed by press statements.

After conclusion of engagements at Cyprus, the Prime Minister will leave for Calgary, Canada to participate in the G-7 summit and then visit Croatia.

Amit Shah reviews preparation for upcoming Census

Vijaita Singh

NEW DELHI

A day before the notification to conduct the Census will be published in the official Gazette, Union Home Minister Amit Shah on Sunday reviewed the preparation for the exercise.

The Union Home Ministry said the notification to conduct the Census would be published in the official Gazette on Monday.

Around 34 lakh enumerators and supervisors, and 1.3 lakh Census functionaries would be deployed for the exercise, to be conducted in two phases. The Census will conclude by March 1, 2027.

The Ministry of Home Affairs said the Census would be conducted through digital means using mobile applications where provision of self-enumeration would also be made available to the people.

Data security

“Very stringent data security measures would be kept in place to ensure data security at the time of collection, transmission and storage,” it said.

The Census would be conducted in two phases – House Listing Operation (HLO) when the housing conditions, assets and amenities of each household will be collected, and Population Enumeration (PE), which would capture

The notification to conduct the Census will be published in the official Gazette on Monday

the demographic, socio-economic, cultural and other details of every person in each household. In Census, caste enumeration would also be done, the Ministry said.

The review meeting was attended by Union Home Secretary Govind Mohan, Registrar General of India and Census Commissioner Mritunjay Kumar Narayan and other senior officials.

On June 4, the Ministry of Home Affairs announced the commencement of the Census, adding that it would have a reference date of 12 a.m. on March 1, 2027.

‘Redraw constituencies’

As per the constitutional mandate, the first Census after 2026 can be used as the basis to redraw Lok Sabha constituencies. The next general election is expected to be held in 2029.

The last census was held in 2011 and the subsequent exercise, scheduled to take place in 2021, was delayed indefinitely, initially due to the COVID-19 pandemic. On April 30, the Union Cabinet had decided to include caste enumeration as part of the next census exercise.



Medium and message: Kerala child rights panel to launch Internet radio for children

The Hindu Bureau
THIRUVANANTHAPURAM

Come June 18, children in Kerala will get to enjoy an Internet radio station made exclusively for them, thanks to the efforts of the Kerala State Commission for Protection of Child Rights (KeSCPCR). Radio Nellikka will be inaugurated by Chief Minister Pinarayi Vijayan.

Programme schedule

The Internet radio will begin with four hours of programming initially that can be heard from anywhere in the world. New programmes will be broadcast



Radio Nellikka will be inaugurated by Kerala Chief Minister Pinarayi Vijayan.

from Monday to Friday, while repeat programmes will be aired on Saturday and Sunday.

The idea of an Internet radio for children was first conceived during the previous tenure of KeSCPCR Chairperson K.V. Manoj Kumar, who, inspired by various local radio groups among children, thought of translating the idea to a wider canvas, especially considering the commission's reach. The idea is finally coming to fruition in Mr. Kumar's second tenure.

The launch of the radio assumes greater significance especially against the backdrop of growing mental health challenges, ills of substance abuse, perils of cyberspace, increas-

ing social media addiction and rise in suicide by children.

Mr. Kumar says that as the commission has as its objective the creation of a child-friendly Kerala, messages and promotions towards that, laws related to children, commission's orders, and children's rights and responsibilities will all be dealt with during the various programmes intended to reach children through parents. The idea is to reach out to people through messages on children's protection, education, and empowerment.

The commission also hopes to put across its or-

ders to society without risks of misinterpretation through the radio, says Mr. Kumar.

Speeches by prominent personalities and interactions with experts will be broadcast to examine aspects related to child safety and prevention of violence and abuse against them.

The commission will prepare segments related to its orders and news and other official matters. An internal committee has been formed to analyse the programmes broadcast.

Radio Nellikka is available on Play Store and App Store or can be accessed on atradiionellikka.com



Axiom launch scheduled for June 19, says Minister

Jacob Koshy

NEW DELHI

The Axiom Mission 4 (Ax-4), which is set to carry Indian astronaut Shubhan-shu Shukla and three others to the International Space Station (ISS), is scheduled to take off on June 19, “as of now”, Union Minister of State for Science and Technology Jitendra Singh said on Sunday.

This comes a day after the ISRO first declared and then deleted the date of the launch, which has been repeatedly postponed.

He played down perceived differences between ISRO and SpaceX on the threat posed by an “oxygen leak” discovered during an engine test on June 8. “As far as our understanding goes, there has been an optimum amount of mutual cooperation. As soon as the leakage was pointed out, both teams joined together and agreed to address that [the leakage],” the Minister said.

On June 10, the ISRO had said on its website that it “recommended” on-site repairs or replacement and a “low temperature leak test” before the vehicle was cleared for launch. A media report claimed that ISRO had to insist on such a test.

Former NASA astronaut and director of human spaceflight at Axiom Space, Peggy Whitson, will command the commercial mission, while Mr. Shukla, the ISRO astronaut, will serve as the pilot.

(With PTI inputs)



