

Q2 investments up 42.5%, capex recovers: data

ECONOMICS & DEVELOPMENT

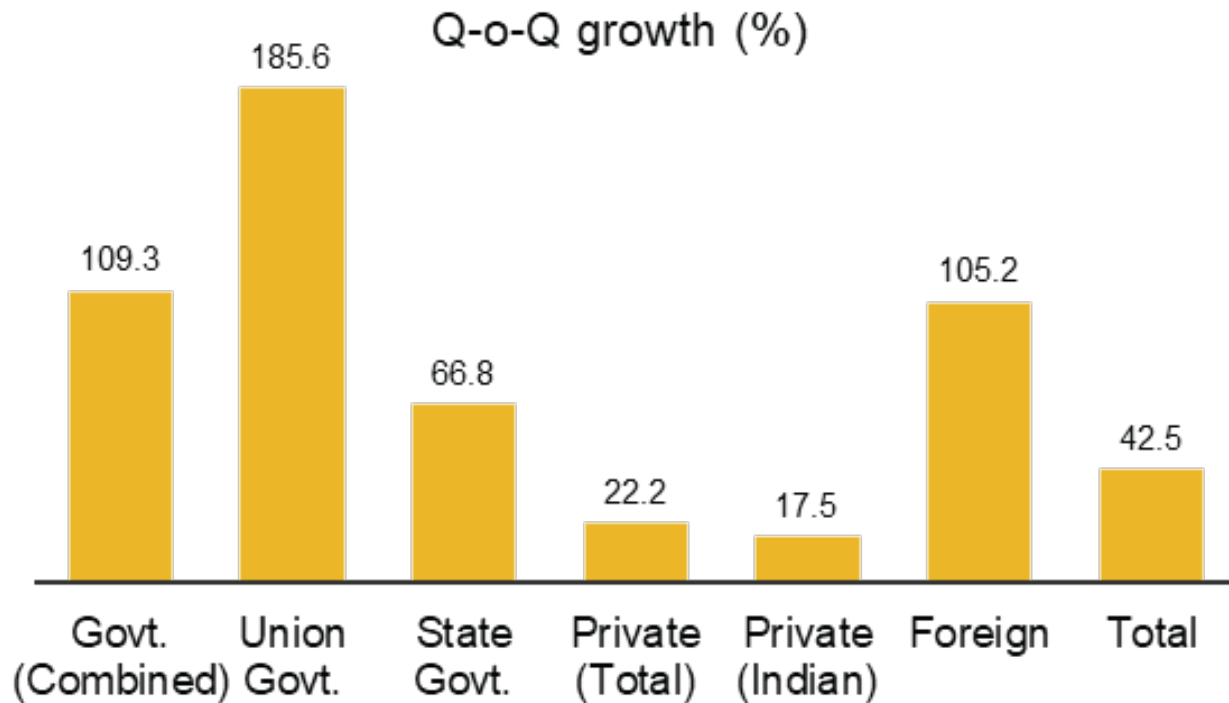


FIGURE: Column chart representation of the quarter wise growth rates of investments.

Fresh investment plans rebounded significantly in the July-to-September quarter, as government capital expenditure recovered from a lull caused by the Lok Sabha election. Private investors also increased their outlays, though at a slower rate, resulting in new project investments reaching the second-highest level in the past 18 months.

Overall investments surged by 42.5 % in the second quarter (Q2) of 2024-25, reaching ₹ 9.21 lakh Cr., compared to ₹ 6.46 lakh Cr. in the first quarter (Q1). State administrations increased new outlays by 67% to nearly ₹ 1.62 lakh Cr., surpassing Central government capex plans, which saw a significant rise of 185.6 % to around ₹ 1.54 lakh Cr. in Q2.

Private sector investments increased at a more moderate pace of 22.2 %, making up nearly 66 % of the total investment. Foreign investors doubled their planned investments in India to ₹ 54,519 Cr. in Q2, while domestic private capital rose by 17.5 %, totalling ₹ 5.51 lakh Cr. This domestic investment has been monitored alongside new and ongoing projects in the country since 2000.

Maharashtra on top

In Q2, Maharashtra continued to lead in attracting investments with 661 projects worth ₹ 2.81 lakh Cr. Gujarat improved from fifth place in Q1 to second, securing nearly ₹ 1.39 lakh Cr. Karnataka and Tamil Nadu regained ground, coming in third and fourth with ₹ 97,740 Cr. and ₹ 46,662 Cr., respectively,

after dropping to eighth and tenth in Q1. Additionally, the former State of Jammu and Kashmir made its first appearance in the top 10, attracting investment plans worth ₹18,592 Cr.

In the first quarter of the fiscal year, major project announcements by Central government agencies were postponed due to the election code of conduct during the Lok Sabha polls, and the private sector also delayed significant capital expenditure plans. However, following the reinstatement of a stable government on June 9, the second quarter saw a surge in investment announcements from both public and private sectors.

In Q2, the mining sector experienced a quarter-on-quarter contraction in fresh investment projects, declining by 18.1 %. In contrast, manufacturing investments surged nearly 79 % to over ₹ 2.22 lakh Cr., while new infrastructure projects increased by 45 % to about ₹ 4.17 lakh Cr. Additionally, electricity and irrigation projects rose by 24.2 % and 24.7 %, respectively.

In Q2, a total of 2,684 new investments were announced, with 1,093 from government projects and 1,591 from the private sector. A rise in mega projects valued at least ₹ 1,000 Cr., increasing from 132 projects worth ₹ 4.02 lakh Cr. in Q1 to 173 projects worth ₹ 6.38 lakh Cr. in Q2, reflecting greater confidence among project promoters.

Foreign portfolio investors withdraw ₹ 85,790 cr. from Indian equities in October

ECONOMICS & DEVELOPMENT

Foreign investors have continued selling in the Indian market, pulling out a massive ₹ 85,790 Cr. (\$ 10.2 billion) from equities in October due to Chinese stimulus measures, attractive stock valuations, and the elevated pricing of domestic equities. October is turning into the worst-ever month in terms of foreign fund outflows. In March 2020, FPIs withdrew ₹ 61,973 Cr. from equities. The latest outflow came after a nine-month high investment of ₹ 57,724 Cr. in September.

Since June, foreign portfolio investors have consistently bought equities after withdrawing ₹ 34,252 Cr. in April-May. Overall, FPIs have been net buyers in 2024, except for January, April, and May, data with the depositories showed. Looking ahead, the trajectory of global events such as geopolitical developments and interest rate movements will play a crucial role in shaping future foreign investment in Indian equities.

On the domestic front, key indicators such as inflation trends, corporate earnings, and the impact of festive season demand will also be closely watched by FPIs as they assess opportunities in the Indian market. According to the data, FPIs made a net withdrawal of ₹ 85,790 Cr. from equities between October 1 and 25.

No signs of reversal

The sustained FPI selling impacted market sentiments, pulling the NSE's benchmark index Nifty down by 8 % from the peak. The trend of FPI selling is showing no signs of reversal any time soon. The selling was triggered by the Chinese stimulus measures and the cheap valuations of Chinese stocks. The elevated valuations also made India the top choice of FPIs to sell. This month witnessed significant outflows in FPI as geopolitical tensions and shifting global economic conditions influenced investor sentiment.

Sri Lankan Navy arrests 12 fishers from Nagapattinam

INTERNATIONAL RELATIONS

Sri Lankan Navy arrested twelve fishermen from Tamil Nadu's Nagapattinam district on Saturday for allegedly trespassing on the island country's waters. The group had departed from the Akkaraipettai fishing harbour around 8 a.m. on Saturday on a registered boat, and was reportedly fishing approximately 40 nautical miles southeast of Kodiakkarai before being intercepted by the Sri Lankan Navy. They were arrested, and subsequently taken to the Kankesanthurai Naval Base for investigation.

Centre defends Aadhaar-based wage payment, says it ensures greater inclusion, efficiency

POLITY & GOVERNANCE

The Union Rural Development Ministry defended using the Aadhaar-based Payment System (ABPS) for MGNREGS workers, calling it a "major reform" that helps in better targeting, increased efficiency, reducing delays in payments, and greater inclusion by curbing leakages.

The Aadhaar-based Payment System (ABPS) has been made mandatory from January 1, 2024. As on October 26, 13.1 Cr. active workers, or 99.3% of the total number of active workers, are eligible for ABPS. Approximately 84.8 lakh workers were removed from the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) between April and September. At the same time, only 45.4 lakh new workers had been added, with net deletion of workers standing at 39.3 lakh.

LibTech, a consortium of activists and academics, pointed to the high rate of deletion of workers enrolled under the programme that coincides with the government's insistence on using the ABPS for wage payments.

The Aadhaar-based Payment System (ABPS) conversion was a major reform process, where benefits are credited directly into bank accounts based on the Aadhaar numbers of workers under the MGNREGS, doing away with several layers in the delivery process.

India to procure 15 more C-295 transport aircraft from Airbus

POLITY & GOVERNANCE



Prime Minister Narendra Modi and Spanish Prime Minister Pedro Sanchez will jointly inaugurate the Tata Aircraft Complex at Vadodara which will manufacture the C-295. India is looking to procure 15 additional C-295 transport aircraft from Airbus, beyond the 56 already contracted, of which 12 would be manufactured in India by Tata Advanced Systems Ltd. (TASL), while three would come in fly-away condition.

The Tata Aircraft Complex at Vadodara involving the full development of a complete

ecosystem from the manufacture to assembly, test and qualification, to delivery and maintenance of the complete life cycle of the aircraft will be the first private sector Final Assembly Line (FAL) for military aircraft in India.

The 15 aircraft are for the maritime reconnaissance role being developed by the Defence Research and Development Organisation. The Defence Ministry had signed a ₹ 21,935 Cr. contract with Airbus Defence and Space SA, Spain, in September 2021 for the supply of 56 aircraft. Of these, 16 will come in fly-away condition from Spain and 40 will be built in India by TASL in collaboration with Airbus at the FAL in Vadodara.

The FAL was set in a record time of just two years. For 40 aircraft to be made in India by TASL, a substantial proportion of C-295 components, sub-assemblies and major component assemblies of aero structure are planned to be manufactured in India. The Indian Air Force has already inducted six aircraft in its 11 Squadron based at Vadodara.

CERT-In releases advisory on online scams

POLITY & GOVERNANCE

The Computer Emergency Response Team of India (CERT-In) shared a list of ways in which online scams are being perpetrated by fraudsters in the country, including “digital arrest”.

The CERT-In advisory listed “digital arrest” as an online scam as “government agencies do not use platforms like WhatsApp or Skype for official communication”. It stressed that people should not transfer money “under pressure” as legitimate law-enforcement agencies “will never pressure you into sending money immediately”. The advisory said staying “vigilant and informed” is crucial to protect oneself from this “emerging cyber threat”.

The public advisory talks about more than a dozen ways fraudsters use to dupe people and steal their money and private data. The advisory suggested a host of practices and countermeasures to stay vigilant against such crimes and not give in to the “pressure tactics” deployed by cybercriminals, who seek quick action by creating “a sense of urgency”.

Beyond intoxication

POLITY & GOVERNANCE

The Supreme Court of India has given a boost to the federal principle behind the distribution of powers between the Centre and the States. A nine-judge Bench has clarified the scope of Entry 8 in the State List under the Seventh Schedule in the Constitution to cover both ‘potable alcohol’ and alcohol that can be used to the detriment of public health. It takes in its fold the entire gamut of activities involving the production, sale and distribution of alcohol products, covering rectified spirit, extra neutral alcohol and denatured alcohol. In other words, the entry is not limited to the popular understanding of intoxicating liquor as alcoholic beverages consumed by people. The bone of contention was whether a central law, the Industries (Development and Regulation) Act (IDRA), 1951, which listed ‘fermentation industries’ as a scheduled subject on which the Union government could exercise control, had the effect of removing ‘industrial alcohol’ from the regulatory purview of State governments. The majority ruling of eight judges has the effect of excluding the industry of ‘intoxicating liquor’, as interpreted in the judgment, from the purview of the IDRA. According to the SC verdict, Parliament lacks legislative competence to take control of the entire industry of intoxicating liquor. The Chief Justice of India, D.Y. Chandrachud in his opinion on behalf of the majority has noted that any other interpretation would upset the federal balance in the

distribution of legislative powers and tilt it towards the Union.

This is the second major verdict by the Supreme Court in recent months that has upheld federal principles. In July, a nine-judge Bench ruled that States can tax mineral rights and mineral-bearing lands, a decision that preserved their legislative domain from interference by Parliament. As in that case involving mineral rights, Justice B.V. Nagarathna has authored a dissenting verdict in the 'intoxicating liquor' case too. The Constitution Assembly, she says, was clear that the term only meant potable alcohol and there was no intention on its part to include non-potable or industrial alcohol. In her view, Parliament occupied the field of 'fermentation industries', but excluded alcohol for human consumption. To that extent, the States are denuded of their power to regulate industrial alcohol. Justice Nagarathna's dissent underscores the importance of industrial alcohol to the country's economy, both as a key feedstock in the chemicals industry and liquid fuel to be blended with petrol. In the light of this understanding, the Centre has made 'fermentation industries', excluding potable alcohol, a scheduled industry under the IDRA. Her observation that the constitutional edifice should not be dislodged while trying to dynamically interpret the Constitution strikes a cautionary note.

The private sector holds the key to India's e-bus push

POLITY & GOVERNANCE

The Union Cabinet has approved the PM E-DRIVE scheme, focusing on electric vehicle (EV) expansion across multiple segments, including public transport. This initiative allocates ₹ 4,391 Cr. for subsidies to aid the procurement of 14,028 electric buses in nine cities, bolstering the shift to EVs within the public transport sector. However, the exclusion of private bus operators from this subsidy framework raises concerns about the broader scalability of electric mobility beyond state-operated buses.

Public sector driven despite fleet size

India's electric bus deployment has been primarily public sector-led, supported by subsidies under the FAME India scheme. FAME I (2015-19) approved subsidies for 425 buses, which increased to 7,120 buses under FAME II (2019-24). These incentives were available to state and city transport agencies, municipal corporations, and public entities. However, public transport buses constitute only 7 % of India's 24 lakh registered buses, highlighting limited reach within the overall bus sector.

Although private buses make up 93 % of India's bus fleet, they are excluded from major national schemes or incentive programs for electric vehicles. A few private operators, like NueGo and Chartered Speed, have incorporated electric buses, but these numbers are limited. Scaling the electric bus market in India will require policy support to facilitate the transition of private buses to electric models.

An International Council on Clean Transportation (ICCT) study highlights limited financing as a major barrier to private sector adoption of electric buses in India. Challenges include high upfront costs, low resale value as collateral, and a high perceived risk-return profile. Additionally, uncertainty around battery life heightens this perceived risk, further complicating financing efforts.

The hurdles

Electric intercity buses may be more profitable than diesel buses over their lifetime, though high interest and loan payments reduce financial viability in the short term. Despite this, they could significantly benefit private operators by lowering fuel costs. Intercity buses are crucial in India, serving 22.8 Cr. passengers daily, with 57 % of total ridership and 64 % of vehicle-kilometres. Additionally, 40 % of trips fall within the 250–300 km range, making electric buses ideal for these operations.

As India aims to replace 8,00,000 diesel buses with electric ones by 2030, this ICCT report has

highlighted the potential of offering favourable financing options such as interest subsidies and longer loan tenures to ease the financial burden. Additionally, credit guarantees, potentially rolled out through government banks and other designated financial institutions, are a way to help reduce investment risks for financiers.

Another key hurdle for private electric bus adoption is charging infrastructure. FAME-funded facilities are limited to the depots of State transport units, and as 90% of private bus operators in India manage fleets of fewer than five buses, the high land and infrastructure costs can make investing in charging facilities economically impractical. Even if the required space of 70 m² to 120 m² is available, the high cost of land lease rental could severely impact the economic viability of charging stations. Private intercity bus operators may also face challenges due to power supply interruptions, limited grid capacity, and inadequate upstream infrastructure. To accelerate private-sector electric bus adoption, it is essential to develop shared public charging infrastructure within cities and on high-traffic highways, particularly key intercity corridors. State governments could lead the development by leveraging financial subsidies offered under the PM E-Drive scheme, which aims to subsidise 1,800 bus chargers. To encourage private investment, States could also offer additional fiscal incentives or structure tenders for shared charging infrastructure on a design-build-operate-transfer (DBOT) basis, and ensure viability through guarantees of minimum daily energy consumption per charger.

A business model worth following

Another emerging business model, Battery-as-a-Service (BaaS), could reduce the high upfront costs of electric buses by separating battery ownership from vehicle ownership, as seen in China and Kenya. This model, along with battery swapping, has the potential to accelerate private electric bus adoption through usage-linked leasing and other solutions.

To create scale and reduce costs in the electric bus market in India, promoting uptake in the private sector is crucial. As the government forges ahead in supporting the EV transition under the new PM E-DRIVE scheme, there are opportunities for policy in the areas of financing incentives, charging infrastructure, and innovative business models to help overcome barriers to electric bus adoption by private operators.



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Cyber fraud in banking transactions surges in FY24

INTERNAL SECURITY



Chart 1(a): The number of cases of cyber fraud across the years in banking transactions

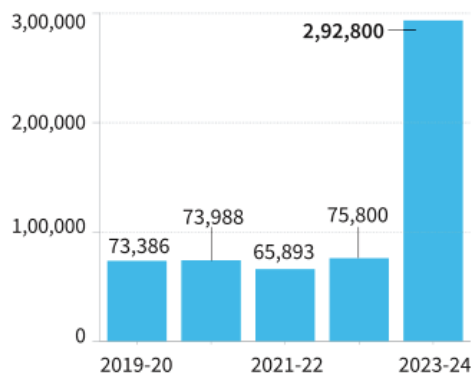


Chart 1(b): The amount of loss incurred from cyber fraud in ₹ crore

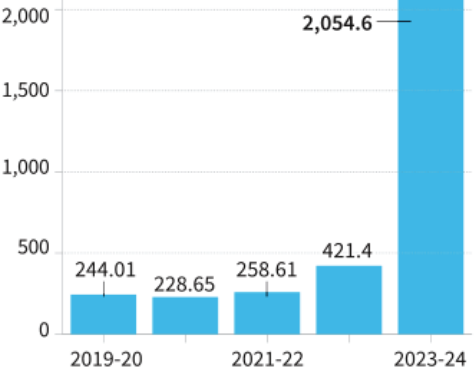


Chart 2: The State-wise share of total cases of cyber fraud in 2022-23. Figures are in %

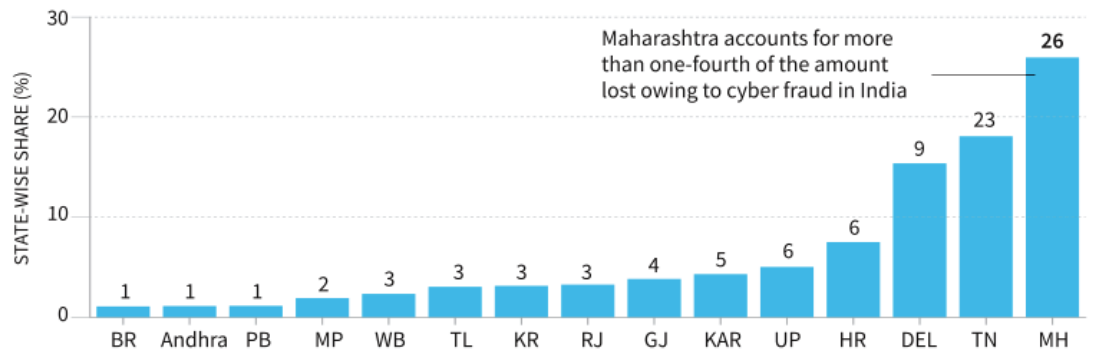


Chart 3(a): The chart shows the number of cases of cyber fraud in public sector and private sector banks

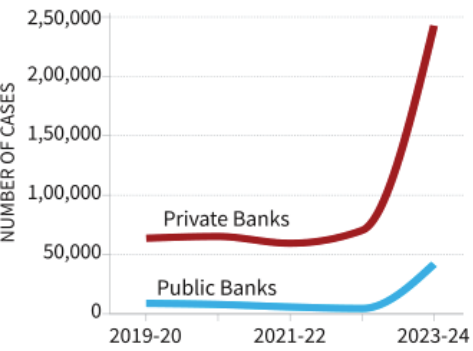
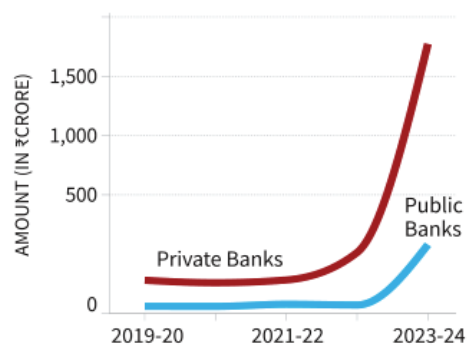


Chart 3(b): The chart shows the values of cyber frauds in public sector and private sector banks



India's impressive expansion in online transactions also coincides with an unprecedented spike in cyber frauds. According to data from the Reserve Bank of India, sent in response to the authors' Right to Information (RTI) application, ₹ 3,207 Cr. was lost because of 5,82,000 cases of cyber fraud between FY2020 and FY2024.

FY2024 has been an exceptional year for cyber fraud, outpacing the previous three years in terms of both the number of incidents and the amount of loss. The number of cyber fraud incidents has increased from 75,800 cases in FY 2023 to 2,92,800 cases in FY2024. The amount of money lost rose from ₹ 421.4 Cr. in FY2023 to ₹ 2,054.6 Cr. FY2024.

Maharashtra accounts for more than one-fourth of the amount lost owing to cyber fraud in India, largely because Mumbai, as the country's commercial capital, records a high volume of online transactions. Tamil Nadu follows closely, representing 23 % of the total value of amount lost due to fraud. Digital transactions have been growing rapidly over the last decade in India. Digital transactions have grown 90-fold in the last 12 years. In 2012-13, there were 162 Cr. digital payments. This number has grown to 14,726 Cr. in 2023-24 till February.

There were two major pushes for digital transactions. The first came in the wake of demonetisation in 2016. The next impetus came during the COVID-19-induced lockdown when physical currency was considered a potential carrier of the deadly virus. Digital transactions are meant to curb tax evasion, corruption, and the use of hard cash in crime. However, the decision to promote them was taken without putting in place adequate measures to prevent cyber fraud. Many people keep falling victim to new forms of online crimes. While financial institutions may implement sophisticated cybersecurity measures, many people find them too complex to navigate. Banks need to catch up and ensure cybersecurity before more money is lost.

Private sector banks collectively account for a much higher value and number of cases of fraud than public sector banks. There has been an unprecedented rise in the amount and number of cases in 2023-24 in both public and private sector banks. However, the increase in the number of cases and value of frauds in private sector banks was much more marked.

The top 5 banks that suffered the highest share of fraud amounts are Kotak Mahindra Bank, Axis Bank, State Bank of India, HDFC Bank, and ICICI Bank. The order keeps changing, but they remained among the top five banks consistently across the five years of data used for this analysis. During these five years, these banks accounted for about 62 % of the total value of reported fraud cases and about 53 % of the total number of fraud cases. Of these five banks, SBI is the only public sector bank. This shows that private sector banks are far more susceptible to cyber-attacks. Perhaps there may be a trade-off in being user friendly and cybersecurity.



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Sustainability science for FMCGs

SCIENCE & TECHNOLOGY

The Anusandhan National Research Foundation (ANRF) was established to promote research and development, and the recently announced BioE3 (Biotechnology for Economy, Environment and Employment) policy that emphasise the need for academia-industry partnership; and the role of the bio-economy in driving the economy while honouring India's commitment to sustainable development and climate action. Specifically, the BioE3 policy notes the need to convert chemical-based industries to sustainable bio-based industrial models. It also provides an opportunity to revisit the impact of new technologies on existing industries such as Fast-Moving Consumer Goods (FMCGs).

Reducing palm oil in soap

The global soap industry significantly contributes to greenhouse gas emissions and biodiversity loss, largely due to its reliance on palm oil. Around 90% of palm plantations are located in Borneo, Sumatra, and the Malay Peninsula, where forested lands are frequently converted to palm oil fields. Despite its environmental impact, palm oil is preferred due to its high yield, making it more profitable for farmers and affordable for consumers. Palm oil meets approximately 40% of global annual vegetable oil demand.

Emerging technologies may offer alternatives to palm oil in soap production, which primarily provides fatty acids for cleansing and structural functions. Synthetic biotechnologies could create artificial fatty acid chains to replace palm oil, especially for structure, while local plant-based materials like polysaccharides could substitute the non-beneficial structural components. Reducing the amount of hard soap could also allow for the inclusion of beneficial agents like antimicrobial peptides or molecules that enhance skin immunity and protection.

Strong support from government and civil society is essential for developing solutions in the soap value chain, including bio-based or bio-synthetic materials and packaging innovations to reduce plastic use. The recent Public-Private Partnership initiative under ANRF, aligned with the BioE3 policy, aims to foster partnerships through funding and encourages the reinvention of traditional products alongside the introduction of new ones.

Locally grown palm oil

Until bio-synthetic or bio-engineered products become a reality, every day-use products like soaps will depend on domestic and international sustainable palm oil plantations. The Government of India launched the National Mission on Edible Oils-Oil Palm in August 2021 with the aim of increasing the oil palm production area to 10 lakh ha. and boosting crude palm oil production to 11.20 lakh tonnes by 2025-26. It is important that such plantations not only adhere to the policy of 'No Deforestation, No Peat', but that they are also carefully selected so that they don't disrupt the surrounding biodiversity. A comprehensive ecological research programme to understand the long-term impact of these monocultures in the context of India's biodiversity is also a strong need, along with regenerative agriculture practices, working with smallholder farmers.

The purchase of locally grown sustainable palm oil and investments in innovation to replace imported palm oil come at a cost, which, when borne by the company, may have to be passed onto the consumer. In a competitive market, this can mean the loss of market share. Government support through funding for research or other fiscal incentives encourage such sustainable practices and help companies innovate in this space.

Current toilet soap grades are decided based on the fatty material present in the soap. This

creates a false equivalency in the government's and consumer's mind that the higher the fatty material in the soap, the better the product's quality. Many publications disprove of this. Regulatory requirements for soap grades should move away from this old 'vertical' compositional standard based on a single material and embrace more horizontal and performance-based standards as those which exist in developed markets and incentivise newer technologies and methodologies linked to consumer benefit, product safety, and environmental sustainability. Furthermore, mandatory labelling of products on a sustainability scale based on their procurement and production practices can also help consumers make informed decisions.

The ANRF and the BioE3 policy are the right ways of moving towards a bio-based economy linked to a strong partnership between academia and industry. Products of everyday use might be a great first place to start, to make a real impact in terms of being both sustainable and self-reliant.

Why is Delhi's air quality deteriorating?

ECOLOGY & ENVIRONMENT

With the withdrawal of the southwest monsoon and the onset of winter, the air quality in Delhi has started to nose-dive. This week, the city and its adjoining territories have consistently recorded particulate matter (PM 2.5) levels exceeding 300, or 'very poor' air quality, and forecasts suggest that this could worsen in the coming days. As is now an established pattern, the decline in air quality coincides with the burning of farm stubble, primarily from Punjab.

What is the contribution of stubble burning to air pollution?

Stubble burning refers to a traditional practice of farmers burning the remnants of paddy stalks after harvesting. This method is often the quickest way, as farmers in Punjab and Haryana have a narrow window of October and November to clear their fields and sow wheat for the winter. The environmental impact of stubble burning has been known since the 1990s. Agricultural researchers, while analysing the economics of rice-wheat cropping pointed out that rising labour costs made it expensive for farmers to collect rice stalks strewn across the field that resulted from the use of mechanical devices such as rice shredders and combine harvesters. Though the burning of rice stalk was initially condemned as a waste of valuable manure, concerns were also raised about its harm to farmers' health. However, its link to worsening air quality in Delhi was quantified only over the last decade and a half. Today, the use of sophisticated instruments, modelling studies, and computational methods have enabled the estimation, almost daily, of stubble burning's contribution to air quality in Delhi.

A study by the research and advocacy group Climate Trends of winter pollution trends in 2023 found a "strong correlation" between wind direction originating from Punjab and Haryana and the resulting pollution levels in Delhi. In the case of Punjab, during winter, 54 % of the time the wind from the State blew towards Delhi, it led to a spike in air pollution; when the wind originated from Haryana, the figure stood at 27 %. Every additional fire incident was correlated with an increase in PM2.5 levels of 12.44 units. Studies over the years, most recently in 2023 by a consortium of IIT Kanpur, IIT Delhi, TERI, and Airshed, Kanpur, found that from mid-October to the end of November 2022, the role of stubble burning to air quality was on average 22% and peaked to as much as 35 %. This is fairly consistent with previous studies that have estimated the contribution of stubble burning to range from 20 % - 40 %. Based on these measurements, the Indian Institute of Tropical Meteorology-Pune (IITM-Pune) maintains an air quality forecast system that models the flow of airborne pollutants through cities. It shows the dynamic nature of stubble burning's impact on Delhi's pollution. For instance, from October 8 to 19 this year, farm fires accounted for less than 1.2 % of the PM 2.5 load in Delhi. During this period, the average AQI stayed from 130 -198 (or the

'moderate' pollution category). However, on October 21, when stubble burning's relative contribution rose to 3.2 %, Delhi's AQI immediately plummeted to 'very poor' (310). On October 23, when the relative contribution of burning reached the seasonal high of 16 %, the index deteriorated to 364, still in the 'very poor' region. On October 26, the stubble burning contribution slightly dipped to 14.5 %, and the AQI improved to 270 or 'poor' quality.

What is the inference from these observations?

The transitioning period from the withdrawal of the monsoon to the onset of winter causes a sharp drop in windspeed, and cause air pollutants to hover closer to the ground rather than being flushed away to the higher realms of the atmosphere. In this situation, any additional source of pollutants — such as from stubble burning — can dramatically spike the pollutant load in Delhi. Also, nearly 55% of the pollution in Delhi originates outside its territorial borders, as studies have shown. Thus, relatively small spikes can push the index as much as 100 points and change categories anywhere from 'poor' to 'very poor.'

So is stubble burning the sole villain in Delhi's pollution?

Urban Emissions, a research outfit that tracks air pollution trends nationally, reports that from 2016-23, the improving air quality reflected in the index going from a high of 285 in 2017 to a low of 173 in 2021. However, in six of these seven years, the index stayed above 216 and therefore within the AQI categorisation of 'poor' air quality. However, in Punjab, the farm fires reduced by over an order of magnitude from 17,467 in 2018 (as of October 25, that year) to 1,749 (October 25) this year. Fire incidents in Haryana too have halved since 2020. The paddy harvested in Punjab is more than twice that in Haryana and yet, this has only improved the index by 65 points at the most. Significantly, December, January, and February are officially considered the winter months by the India Meteorological Department and by this time, the atmospheric conditions that create a trap for pollutants and prevent them from being flushed out, grow stronger. However, stubble burning almost entirely ceases. Despite that, data compiled by Urban Emissions says, the air quality index has consistently remained in the 'very poor' and 'severe' (400+) category from 2016-23. This suggests that sources other than stubble burning contribute significantly to air pollution.

Which are these factors?

On October 25 this year, stubble burning was responsible for nearly 15 % of Delhi's air pollution. On the same day, 'Delhi transport' which includes particulate matter from vehicles and vehicles crossing into Delhi was responsible for about 18 % of the PM 2.5 load, according to the IITM's air quality forecast system. The IIT Kanpur, IIT Delhi, and Teri consortia analysis of the sources of pollution in Delhi found that the real-time source apportionment of PM 2.5 results show secondary inorganic aerosols (SIA), which travel from beyond Delhi, contribute the highest to Delhi's pollution load. The average of winter pollution source apportionment shows SIA (32 %) and biomass burning within and outside Delhi (24 %) contribute the most followed by vehicles at 17 %. The SIAs form when gaseous precursors like sulfur dioxide (SO₂), nitrogen oxides (NO_x), and ammonia (NH₃) react to form ammonium sulfate or ammonium nitrate. In winter, the mean contribution of SIA from the sources within Delhi is 16% and the rest 84 % from outside Delhi. In the last few years, policymakers have realised that the sources of air pollution can be tackled only via an airshed approach that requires coordinated action by multiple States including those beyond Delhi to evolve a joint response to the pollution crisis.

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