



India's Broken Power Economics

Addressing DISCOM Challenges

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▶ Key Takeaways

- India's power sector urgently needs reform. Despite five bailouts, the latest in 2021-2022, DISCOMs (distribution companies) accumulated losses reached approximately ₹6.77 lakh crores (€74.4 billion) by 2022-2023.
- India's 2030-2032 energy strategy is at a critical juncture. Over the next eight years, the country plans to add 80 GW of coal-fired capacity while simultaneously targeting 270 GW of renewable energy to achieve the ambitious goal of sourcing 50% of its total power capacity from non fossil fuel sources.
- Chronic operational and financial inefficiencies necessitate a transformative shift for DISCOMs, evolving into power network managers dedicated to delivering reliable service and market-based pricing.
- Bold reforms, such as the Green Energy Open Access Rules and the Electricity (Amendment) Bill, 2022, seek to drive competition through open access and cross-subsidy balancing, while e-RUPI can strengthen targeted subsidy distribution and transparency.

Introduction

India's electricity demand is rising at an impressive annual rate of 9%. From 2014 to 2023, the country's gross domestic product (GDP) surged from 1.95 trillion dollars (\$) to \$3.2 trillion (constant 2015 US\$), and the nation is poised to maintain this upward trajectory, with projected growth rates exceeding 7% in 2024 and 2025.¹ Correspondingly, peak power demand has soared from 136 gigawatts (GW) in 2014 to 243 GW in 2024, positioning India as the world's third-largest energy consumer. In the past decade, the country has increased its power generation capacity by a remarkable 190 GW, pushing its total installed capacity beyond 400 GW.²

India's renewable energy sector is equally impressive, ranking fourth globally in total installed capacity.³ India reached its goal of sourcing 40% of its installed electric capacity from non-fossil fuels by November 2021. At COP26, the country took an ambitious leap, committing to 500 GW of non-fossil fuel-based energy by 2030. This bold commitment aligns with India's pledge to cut projected carbon emissions by 1 billion tonnes and reduce the carbon intensity of its economy by 45% by the end of the decade.

Yet no sector embodies the nation's "land of paradoxes," quite like the power sector. On the one hand, it's a success story: India has made remarkable strides in renewable energy generation and achieved near-universal household access to electricity. On the other hand, the sector remains plagued by inefficiencies in power generation, transmission, distribution, and financing. These challenges are compounded by the fiercely competitive landscape of "free electricity" promises at the state level.

Consumers still face frequent power cuts, especially during scorching summer months, and grapple with steep electricity prices, disproportionately affecting lower-income households. The root of these challenges lies in dysfunctional electricity politics, leaving India's power economics in disarray. This troubling situation casts doubt on the future of sustained growth in renewable energy generation and underscores the urgent need for a critical reassessment of the path forward.

Challenges Confronting India's Power Sector

India's power sector is characterized by a decentralized structure that balances central and state-level control. The central government influences generation through entities like the National Thermal Power Corporation (NTPC) and transmission via Power Grid Corporation, while state-run DISCOMs manage most distribution. Each state sets its own electricity tariffs and policies through State Electricity Regulatory Commissions (SERCs).

1. World Bank, "GDP (Constant 2010 US\$) – India", 2023, available at: <https://data.worldbank.org>.

2. U.S. Department of Commerce, "India - Renewable Energy", 2024, available at: www.trade.gov.

3. REN21, *Global Status Report 2024*, 2024, available at: www.ren21.net.

Financial instability despite reforms

The Electricity Act of 2003 is the central law regulating India's electricity sector and brought significant reforms to overhaul India's power sector. Before this Act, State Electricity Boards (SEBs) controlled all aspects of power generation, transmission, and distribution. However, these boards were plagued by financial instability and poor management. Transmission and distribution (T&D) losses frequently exceeded 40% due to outdated infrastructure and rampant electricity theft.⁴

The Electricity Act of 2003 unbundled the State Electricity Boards (SEBs) into distinct entities for generation, transmission, and distribution. This restructuring created three key organizations: Generation Companies (GENCOs) for power generation, Transmission Companies (TRANSCOs) for managing electricity flow, and Distribution Companies (DISCOMs) for delivering power to consumers.⁵ By August 2021, most large states had adopted this unbundling approach, though a few smaller states still maintained integrated departments.⁶ Tariff-setting was transferred to autonomous State Electricity Regulatory Commissions (SERCs), ensuring state governments directly fund subsidies, thereby enhancing financial accountability.

The Electricity Act of 2003 legalized power trading, allowing licensed companies to buy and sell electricity, and prioritized rural electrification by promoting decentralized systems. It also encouraged private investment in the generation and promotion of renewable energy sources (RES). The Act introduced Open Access, giving consumers the freedom to choose their electricity suppliers, while new consumer protection measures improved service quality and established grievance mechanisms.

The Act significantly reduced power shortages and sped up rural electrification. In under 20 years, more than 900 million people gained electrical connections, achieving almost universal access to electricity by 2019.⁷ The generation sector also saw impressive growth, with private companies like Adani Power Ltd. and Tata Power Company Ltd., now controlling over 52% of the total power generation capacity.⁸

However, while the generation sector thrived, state-controlled transmission and distribution entities (TRANSCOs and DISCOMs) have struggled to attract private interest. Their severe financial instability, inefficient processes, and lack of transparency make them less appealing to private investors.

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4. U.S. Department of Energy, "Case of Reforms in the Indian Power Distribution Sector, 2010, available at: www.osti.gov.

5. Government of India, *The Electricity Act, 2003*, 2003, available at: <https://powermin.nic.in>.

6. PRS India, "Impact of Ujwal DISCOM Assurance Yojana (UDAY)", 2021, available at: <https://prsindia.org>.

7. International Energy Agency, "India Energy Outlook 2021: Energy in India Today", 2021, available at: www.iea.org.

8. Deccan Herald, "Private Sector Owns over 52% of Installed Power Generation Capacity of 446 GW", 2023, available at: www.deccanherald.com.

DISCOMs' ongoing challenges

State-owned DISCOMs power 90% of Indian consumers and supply 80% of the country's electricity, yet they remain the most fragile element in the supply chain. DISCOMs face crippling challenges, from escalating costs and revenue shortfalls to inefficiencies in both supply and demand management.

On the supply side, expensive long-term Power Purchase Agreements (PPAs), frequent renegotiations, and soaring coal prices intensify financial pressures. Meanwhile, delays in infrastructure upgrades, neglected maintenance, and sluggish adoption of competitive bidding undermine supply reliability and service quality.

On the revenue side, irregular tariff revisions—often stalled for seven to ten years in some states—have hampered financial sustainability.⁹ Delayed payments, including state government subsidies, exacerbate the issue, with a large share of unpaid dues from government departments such as municipal corporations, hospitals, and schools. DISCOMs resort to high-cost, short-term loans to bridge these financial gaps, a stopgap that jeopardizes their long-term stability.

This reliance on costly loans to purchase electricity on the retail market ultimately drives up consumer electricity prices, impacting smaller consumers disproportionately. For instance, in many states, electricity prices have surged by 85%-90%, and households

consuming up to 200 units per month have seen their bills nearly double¹⁰—an ironic twist for the very groups that were supposed to benefit from state electricity tariff subsidies.

Out of 36 states and Union territories, 27 offer subsidized electricity, costing the nation a staggering 1.32 trillion rupees (₹)—approximately 14.5 billion euros (€)—in the 2020-2021 financial year alone.¹¹ Without state government subsidies, consumers would see an average tariff

increase of 40% next year, with similar hikes needed each year for the following nine years if current losses and subsidies persist.¹²

DISCOMs are heavily indebted, and credit rating downgrades have made borrowing more expensive, worsening their financial instability. This leads to frequent contract renegotiations and delays in renewable project commissioning, discouraging private investment and increasing reliance on costly thermal power.

In many states, electricity prices have surged by 85%-90% and households have seen their bills nearly double

9. National Institute of Public Finance and Policy, "DISCOM Finance Working Paper", July 2024, available at: www.nipfp.org.in.

10. Mee Seva, Government of Andhra Pradesh, "White Paper on AP Power Sector", 2024, available at: <https://ap.meeseva.gov.in>.

11. S. Goswami, "27 States Providing Power Subsidy: MP, Rajasthan, and Karnataka Top List", *Hindustan Times*, August 8, 2022, available at: www.hindustantimes.com.

12. National Institute of Public Finance and Policy, "DISCOM Finance Working Paper", op. cit.

Ineffectiveness of bailout schemes

Successive governments have repeatedly tried to rescue state-run DISCOMs through financial schemes. Yet, these measures proved to be short-term fixes, as DISCOMs accumulated a staggering ₹3.96 lakh crore (€43.56 billion) in debt by September 2015.¹³

In a significant shift, the UDAY scheme introduced in 2015 moved away from direct financial aid to states, opting instead for incentives like increased domestic coal supply and optimized coal linkages. UDAY required states to take over 75% of their DISCOMs' outstanding debt—50% in 2015-2016 and 25% in 2016-2017. By March 2020, 15 out of 27 participating states had absorbed ₹2 lakh crore (€22 billion) in DISCOM debt. Additionally, states were tasked with progressively covering a more significant share of DISCOMs' financial losses, from 10% in 2018-19 to 50% in 2020-2021.¹⁴

The scheme also set operational benchmarks, such as reducing aggregate technical and commercial (AT&C) losses to 15% by 2018-19, though these targets varied across states. UDAY aimed to enforce financial discipline, reduce power costs, and improve DISCOM efficiency.

However, despite these goals, the sector's economic woes persisted. Between 2014-2015 and 2019-2020, DISCOM's gross annual losses—excluding UDAY grants and regulatory income—increased from ₹59,000 crore (€648.5 million) to ₹75,000 crore (€825 million).¹⁵ Prompting a return to monetary assistance through the Revamped Distribution Sector Scheme (RDSS), which was initiated in 2021-22 with a staggering budget of approximately ₹3 trillion (€33 billion), including nearly ₹1 trillion (€11 billion) in government support. As this scheme approaches its conclusion in two years, the government has announced a second phase set to commence in 2026-2027, reflecting the same financial commitments as the first.¹⁶ Each bailout follows the same script: states are pushed to implement long-overdue reforms in exchange for taxpayer-funded financial aid. Yet the underlying structural issues remain unresolved.

Each bailout follows the same script: states are pushed to implement long-overdue reforms in exchange for taxpayer-funded financial aid

13. UDAY Portal, Ministry of Power, Government of India, "UDAY Journey", March 29, 2017, available at: www.uday.gov.in.

14. NITI Aayog, "Final Report of the Research Study on Diagnostic Study for Power Distribution", 2019, available at: <https://web.archive.org>.

15. Power Finance Corporation, "Report on Performance of Power Utilities 2019-20", 2021, available at: <https://pfcindia.com>.

16. National Institute of Public Finance and Policy, "DISCOM Finance Working Paper", op. cit.

Balancing coal dependence with India's renewable energy surge

Coal remains the cornerstone of the nation's energy supply, meeting over 44% of India's total primary energy demand.¹⁷ The coal dominance underscores the urgent need for a more diversified energy strategy, especially as oil consumption surges due to increasing vehicle ownership and improved road transport.

As of August 2024, RES now make up around 44% of the country's total energy capacity and stands at an impressive 199.52 GW. Solar Photovoltaic (PV) has become the leading force in cost-effective power generation, representing approximately 44% of India's total renewable installed capacity.¹⁸ This remarkable growth is fueled by an accelerated auction schedule for utility-scale solar PV projects, a significant drop in solar PV module prices, and robust policy support driving the expansion of domestic PV manufacturing.¹⁹

Renewable energy growth

To achieve its ambitious goal of 50% of its total power capacity from non-fossil fuel sources, India needs to add over 270 GW of RES capacity in the next six years, making it one of the largest expansions in the world.

The country is developing solar cities and parks, approving 57 solar parks totaling 39.28 GW nationwide. The Union Budget for 2024-25 includes a substantial allocation of INR 10,000 Cr (€1.1 billion) for the Centrally Sponsored Scheme for Solar Power (Grid), reflecting a remarkable 110% increase from the previous year. Additionally, The PM-Surya Ghar Muft Bijli Yojana, launched in February 2024, aims to increase solar rooftop capacity and help households generate their own electricity. The program has a budget of INR 75,000 crore (€8.25 billion), which includes INR 6,250 crore (€687.5 million) designated specifically to support rooftop solar installations up to 3 kW.²⁰ In tandem, India is making significant strides in wind power, boasting a capacity of 47.07 GW as of July 2024 and ambitious plans to add 30 GW of offshore wind energy by 2030.²¹

To strengthen its RES energy framework, India finalized its Carbon Credit Trading Scheme (CCTS) for the Indian Carbon Market (ICM) through a gazette notification on June 28, 2023. The country plans to launch a national Emission Trading System (ETS) by 2026, enabling carbon trading under bilateral and cooperative agreements through the National Designated Authority for implementing the Paris Agreement (NDAIAPA).²²

17. International Energy Agency, "India Energy Outlook 2021", op. cit.

18. Invest India, "Renewable Energy Sector in India", 2024, available at: www.investindia.gov.in.

19. International Energy Agency, "Renewables 2023: Executive Summary", 2024, available at: www.iea.org.

20. Government of India, "PM Surya Ghar Muft Bijli Yojana", 2024, available at: www.india.gov.in.

21. Invest India, "Renewable Energy Sector in India", 2024, available at: www.investindia.gov.in.

22. Invest India, "Carbon Markets Report", available at: <https://static.investindia.gov.in>.

These measures have attracted international players, notably EDF, which is leading the charge with 18 RES projects and 2.8 GW of capacity nationwide.²³ Engie follows closely with a robust portfolio of 22 projects totaling 2.3 GW of installed capacity.²⁴ Meanwhile, Enel, TotalEnergies, and Shell boast RES projects in their Indian portfolios.

Multilateral investment banks, including Agence Française de Développement (AFD), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and KfW, are partnering with Indian public institutions such as the Indian Renewable Energy Development Agency (IREDA). However, a substantial financial gap persists in India's clean energy sector. The IEA estimates that India needs an average of €142 billion per year across its energy economy through 2030 to achieve net zero emissions by 2070.²⁵ Yet from April 2020 to September 2023, India attracted a mere \$6.1 billion in FDI equity investment.²⁶

Surge in coal-fired power capacity

India's coal-fired capacity is projected to outpace RES growth for the next 3-4 years. In 2024, the country plans to add 13.9 GW of coal capacity, marking the first time since 2019 that coal expansion will exceed that of RES. The Ministry of Power aims to add at least 53.6 GW of coal-fired capacity over the next eight years, alongside the 26.4 GW currently under construction.²⁷

Prime Minister Modi's government justifies this coal dependency by citing energy security amidst soaring power demand, delays in non-fossil capacity deployment, and relatively low per-capita emissions. The Ministry of Power has advised private power companies that coal-based power stations are more viable for meeting peak-hour electricity demand than RES, primarily due to the high costs associated with energy storage technologies.²⁸

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State-owned enterprises, including NTPC, are spearheading the expansion of coal capacity, supported by state-run financiers such as Power Finance Corporation Limited and Rural Electrification Corporation Limited (REC). To ensure project completion, the central government has been reviewing 38 coal generation plants that have faced years of delays, tackling equipment and land acquisition issues.²⁹

23. EDF, "Powering India's Energy Transition", 2024, available at: <https://india.edf.com>.

24. ENGIE, "ENGIE India", 2024, available at: <https://engieindia.com>.

25. International Energy Agency, "India's Clean Energy Transition Is Rapidly Underway, Benefiting the Entire World", 2022, available at: www.iea.org.

26. Press Information Bureau, "Press release", 2023, available at: <https://pib.gov.in>.

27. Reuters, "India to Increase Coal-fired Capacity in 2024 by Most in Least 6 Years", 2024, available at: www.reuters.com.

28. Reuters, "India Wants Private Money for Coal-fired Plants Despite Western Opposition", 2023, available at: www.reuters.com.

29. Reuters, "India Scrambles to Add coal-fired Power Capacity to Avoid Outages", 2023, available at: www.reuters.com.

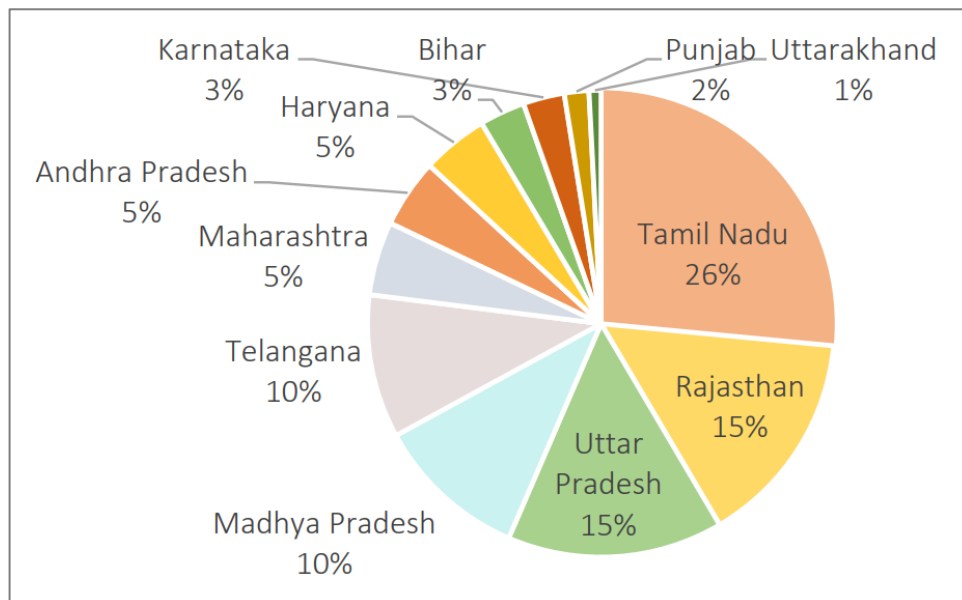
While coal is essential to address immediate energy needs, this dependence threatens to hinder RES expansion and sends mixed signals to global investors who view India as a RES leader. It could deter the private capital needed to secure the staggering \$223 billion investment required to achieve India's RES capacity targets between 2022 and 2029.³⁰

Strategies for financial stability and market evolution

The Government of India has long struggled with the financial collapse of DISCOMs, requiring multiple bailouts over the past two decades. The Revamped Distribution Sector Scheme (RDSS), launched in the 2021-2022 financial year, marks the fifth bailout and the third under Prime Minister Modi's administration.

With each scheme, the identified outstanding liabilities for takeover increased, reaching nearly 2% of India's GDP at that time, and by the fiscal year 2022-2023, public electricity distribution companies had accumulated losses of around ₹6.77 lakh crores (€74.4 billion), with annual increases averaging 10% since 2015-2016.³¹ Alarming, six states account for over 75% of these losses, as illustrated below.

State-wise accumulated DISCOM losses as a percentage of the national aggregated losses



Source: Report on Performance of Power Utilities 2022-23 (updated up to April 2024). Power Finance Corporation.

30. Bloomberg New Energy Finance, "Financing India's 2030 Renewables Ambition, 2022, available at: <https://assets.bbhub.io>.

31. National Institute of Public Finance and Policy, "DISCOM Finance Working Paper", op. cit.

To overcome these challenges, India must embrace innovative policies and technological solutions. Key initiatives such as the Green Energy Open Access Rules of 2022, the ongoing review of the Electricity (Amendment) Bill 2022, and emerging digital tools like e-RUPI must be prioritized.

Green Energy Open Access Rules (2022)

Green Energy Open Access Rules of 2022, revolutionized access to renewable energy by enabling consumers with a minimum load of 100 kW to purchase power directly from generators, bypassing DISCOMs, and is particularly beneficial for Commercial and Industrial (C&I) users.³²

However, this shift directly impacts DISCOMs' revenue and makes subsidizing tariffs for other consumer groups challenging. Although DISCOMs must provide essential services like network access, standby power, and banking, these services are often priced too low. Additionally, the transition to alternative energy sources creates planning uncertainties for DISCOMs, complicating demand forecasting and power procurement.

As smaller residential and agricultural consumers increasingly depend on DISCOMs, the quality of service may decline without adequate government subsidies, potentially resulting in losses of INR 3–4 per unit (a 35% to 45% loss on each unit supplied). These challenges highlight the urgent need for reforms in pricing structures and service models to ensure the sustainability of DISCOMs.

Required evolution of DISCOMs

DISCOMs must evolve from being the sole electricity suppliers to effectively managing the power network, ensuring safe and reliable service for small consumers. This strategic pivot can alleviate many existing challenges, including the political interference that often complicates operations. To succeed, DISCOMs should embrace a model that prioritizes reliable service for small consumers while offering market-based, non-regulated pricing for others.

To implement this transformative vision, several vital measures must be put into place. First, market-based contracting should be introduced to allow High-Tension (HT) consumers access to competitive supply options. Next, it is essential to accelerate RES procurement to deploy low-cost renewables and solarize agricultural feeders. Detailed network planning is needed to manage growing demand and decentralized generation effectively. This must be followed by establishing dynamic tariff structures to reflect real-time demand while investing in enhanced metering infrastructure, ensuring accurate energy accounting. Innovative solutions such as virtual net metering for public entities and group metering for small consumers will further strengthen these efforts. Achieving this

32. Press Information Bureau, "Press Release", op. cit.

transformation will require close collaboration between central and state governments.

Electricity (Amendment) Bill (2022)

The Electricity (Amendment) Bill of 2022 addresses several recommendations from the previous sections. By permitting multiple DISCOMs to operate in the same area without the need for separate networks, the Bill facilitates open and non-discriminatory access to electricity distribution. This empowers consumers to choose suppliers, aligning with modern market-based contracting principles. Additionally, establishing a Cross-Subsidy Balancing Fund ensures fair financial distribution among DISCOMs, while the State Commission's ability to set floor and ceiling tariffs helps stabilize retail prices in a competitive marketplace.

The Bill also introduces a payment security mechanism to ensure timely payments to generation companies, promoting fiscal stability for DISCOMs. It amends qualifications for leadership positions in regulatory commissions, strengthening oversight and supporting the effective implementation of competitive practices.³³

However, the Bill is currently referred to the Parliamentary Standing Committee, where key issues are being examined. A significant concern is sharing existing PPAs among DISCOMs. Since power procurement accounts for 70-80% of DISCOM costs and many states depend heavily on long-term PPAs, this could initially limit cost efficiency and competition. Furthermore, allowing a network-owning DISCOM to compete for supply business raises conflict-of-interest issues, potentially undermining investment in essential network infrastructure³⁴.

Leveraging e-RUPI for subsidy management

To tackle the persistent issues related to state-level subsidies, the introduction of e-RUPI presents a significant opportunity. This digital payment solution enables targeted subsidy distribution, ensuring that benefits reach those in need without the delays and inefficiencies of traditional disbursement systems.³⁵

Integrating e-RUPI into the subsidy framework can improve transparency and accountability in DISCOMs' subsidy allocation. For instance, smart meters can accurately measure average consumption and provide free power to farmers and low-income households. Farmers can then use prepaid e-RUPI coupons to pay for their usage, ensuring that subsidies reflect their consumption. Additionally, combining Aadhaar-based direct benefit transfers with e-RUPI simplifies the process, enabling utility payments tailored to individuals and specific purposes.

33. Lok Sabha, "Reference Notes", 2022, available at: <https://loksabhadocs.nic.in>.

34. PRS India, "The Electricity Amendment Bill, 2022", 2022, available at: <https://prsindia.org>.

35. National Payments Corporation of India, "e-RUPI: Product Overview", 2024, available at: www.npci.org.in.

Aligning energy policies with reality

For decades, state governments across party lines have utilized the promises of “free electricity” and “cheaper power” as electoral bait, ironically undermining the communities they intended to uplift. Alarming, increased tariffs on vulnerable groups often fund short-term power purchases, inadvertently supporting coal-fired capacity in other regions. Meanwhile, India continues to dominate global pollution rankings, with 83 of the top 100 most polluted cities located here. Delhi has held the title of the world’s most polluted capital five times in the past six years.³⁶

The ongoing pattern of repeated bailouts for state-owned utilities highlights a troubling trend of inaction and piecemeal solutions. Without a sustainable, accountable, and technology-driven energy policy, the future of India’s power sector is at risk, jeopardizing not only energy security but also the nation’s ambitious goal of becoming a \$7 trillion economy by 2030.³⁷

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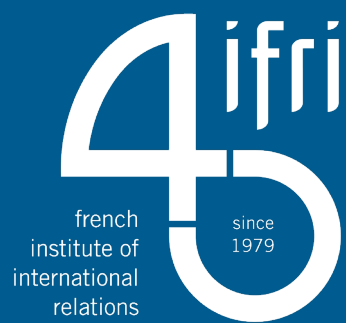
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36. IQAir, “World Air Quality Report”, 2024, available at: www.iqair.com.

37. *The Hindu*, “India to Become Third-largest Economy with GDP of \$5 Trillion in Three Years: Finance Ministry”, January 29, 2024, available at: www.thehindu.com.



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