



Financing, Technology, and Inter-State Coordination: Imperatives for Cleaning India's Air

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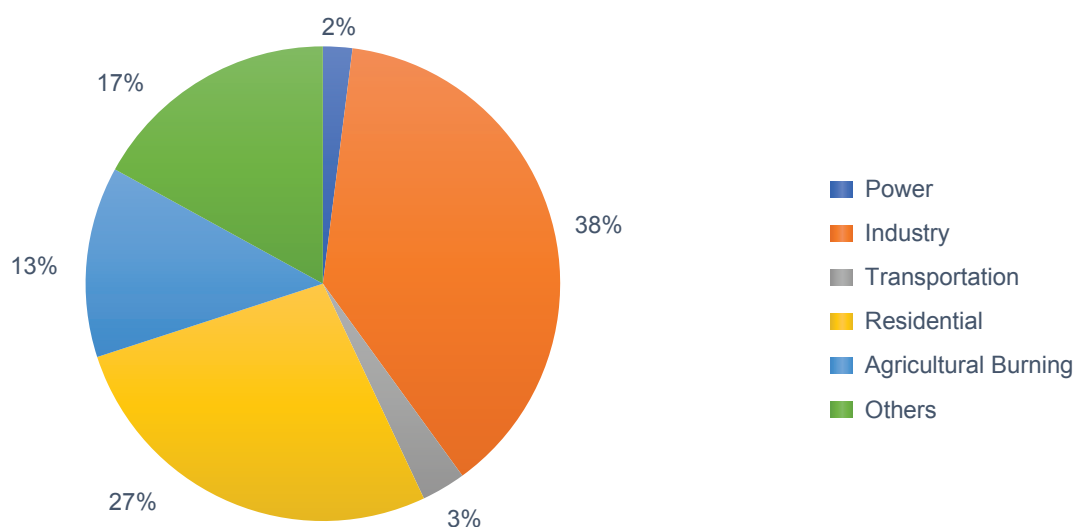


Introduction

Air pollution is a global environmental threat, and a cause of significant proportions of diseases and premature deaths. The threat is massive in India, which continuously fails to meet World Health Organization (WHO) standards¹ and is home to 21 of the 30 most polluted cities of the world.²

Air pollution is caused by particulate matter, oxides of carbon, nitrogen and sulphur, and other pollutants. The primary sources of ambient particulate matter (PM) in India are biomass burning by both commercial and residential establishments, windblown mineral dust, coal burning, industrial emissions, and transport emissions.³ In rural regions, the main source of air pollution is the burning of organic matter; in urban areas, it is industrial and vehicular emissions.⁴ Poor air quality led to over 1.6 million deaths in the country in 2019 alone; the *2020 State of Global Air* report named air pollution the single largest death risk factor in India.⁵

Figure 1:
Sources of PM 2.5 Emissions in India



Source: Council on Energy, Environment and Water (CEEW), 2021⁶

It was in 1981 that India first enacted legislation on air quality—the Air (Prevention and Control of Pollution) Act. In 1986, The Environment (Protection) Act (EPA) was passed as an umbrella law for environmental protection. Later, in 1995, the National Environmental Tribunal was created which established strict liabilities for environmental damage, and in 2010, the National Green Tribunal Act highlighted the right to live in a clean environment. A pivotal effort was made in 2019, with the launch of the National Clean Air Programme (NCAP) designed to reduce air pollution in 122 ‘non-attainment’^a cities and set clear timelines for achieving the targets.

To clean India’s air, however, legislation is only part of the strategy. A requirement is mobilising finances. Crucial decisions—for example, on fossil fuel use and switching to clean energy—will play a key role. The transport sector, which remains a primary source of pollution, will need to be tackled. It is also important for states to collaborate as air pollution is trans-boundary.

In February 2022, ORF, in collaboration with Air Quality Asia (AQA), hosted the 5th annual roundtable consultation, *Addressing India’s Air Pollution Challenge*, where policymakers, scholars, and civil society representatives explored solutions to India’s poor air quality. Panel discussions were held on four broad topics: financing air pollution solutions; transitioning to renewable and cleaner energy; transitioning to sustainable transportation; and the need for inter-state coordination.

a Non-attainment cities are those which did not meet national ambient air quality standards between 2011 and 2015.

Financing Clean Air

A prerequisite for India's transition to a cleaner air is the mobilisation of capital. The NCAP⁷ was launched in 2019, and is India's only national programme for managing air quality in 122 cities across 21 states. It laid down plans to reduce PM2.5 and PM10 emissions by 20-30 percent by 2024 as compared to 2017 levels. It directed the states to prepare action plans to build capacity and achieve better air quality. The NCAP received an initial funding of ₹ 300 crore (US\$41 million) for the first two years. The funds were divided among the 122 cities through their respective State Pollution Control Boards (SPCBs). Under NCAP, 28 cities which had annual PM10 concentrations above 90 ug/m³ (micrograms per cubic metre) received the bulk of the funds, about ₹ 10 crore (\$1.4 million each); the rest was distributed among the remaining 94 cities.⁸

In March 2020, based on the recommendations of the 15th Finance Commission (FC), the government allocated an additional ₹ 4,400 crores (US \$600 million) to urban local bodies (ULBs) for air quality improvement for the year 2020-21. Of this, 50 percent was allocated to 42 cities for the next five years on the condition that they reduce air pollution levels by 15 percent every year.⁹

Other than the allocation of funds, however, mechanisms must be put in place to ensure that these funds are utilised for maximum impact. Yet, there remains ambiguity in fund utilisation and governance.

First, it is a matter of concern that there are two unaligned and disconnected sources of funding to improve air quality. The funds released from the FC's grants are separate from those allocated under NCAP. This could lead to duplication of actions, low impact, and improper utilisation.¹⁰ Second, there is a notable bias in the funding being made available to the non-attainment cities. A significant portion of the NCAP funding has gone to metropolitan cities with populations exceeding 1 million. Similarly, Finance Commission grants have also been allocated to 42 metropolitan cities of more than 1 million.¹¹ Third, the mismatch of sources of

funding has led to a mismatch of cities under both. A few cities that have received FC grants are not listed under the NCAP and therefore have no city-specific action plans for air quality improvement.¹² Lastly, the two funding programmes have different frameworks for monitoring and reporting outcomes. The two mechanisms should be aligned and merged to improve air quality.¹³

Large sums of money have indeed been allocated to reduce air pollution, but a proper action plan, performance metrics and institutional arrangements have to be put in place to make a visible difference. First, the Finance Commission's funds must be aligned with NCAP implementation to avoid duplication of effort. States that have not utilised their share of funds under NCAP should be held accountable. Punjab, for instance, has nine cities in the list of 122, and is also known to cause pollution in the airshed above the Indo-Gangetic plain every winter. Yet it has utilised only 5 percent of the ₹27.5 crore (US \$3 million) allocated to it under NCAP. Similarly, Assam has used only 11 percent and Haryana, 25 percent.¹⁴

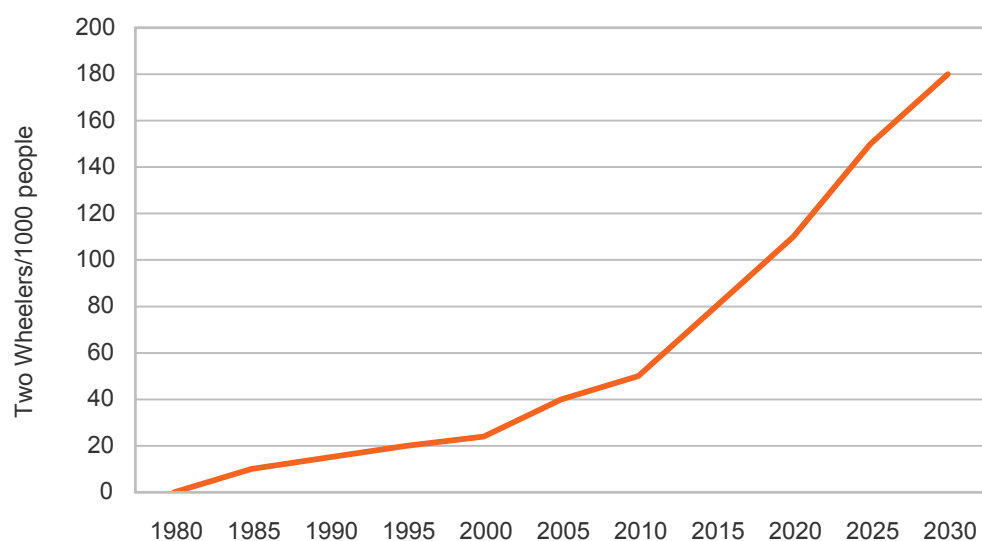
Further, dedicated funding is needed to build capacity in municipalities and improve infrastructure to tackle varied and dispersed sources of emission. Air quality monitoring at the local and airshed level, which includes tracking satellite data, is imperative.¹⁵ Moreover, under both plans, the regulatory capacity is weak. Clear targets, action plans, extensive investment in data, and a suitable legal framework to oversee implementation, are required.¹⁶

Gathering data is crucial for effective investments to be identified, returns on clean air to be evaluated, and performance-based incentives to be allocated and used efficiently.¹⁷ Interventions should lead to substantial air quality improvement, even in the short run. City action plans must prioritise interventions, such as controlling emissions from non-compliant power plants and augmenting public transportation to curb the exponential growth in private vehicle use, and thereby promote low-polluting, cleaner fleet.¹⁸

Transition to Cleaner Transportation Systems

The transport sector remains one of the highest emitters of greenhouse gases (GHGs) in India – around 312.3 million tonnes of carbon dioxide equivalent (CO₂e) in 2018.¹⁹

Figure 2:
Projected Growth of Two-Wheelers Ownership by 2030



Source- Council on Energy, Environment and Water (CEEW) 2020²⁰

India has adopted various measures to reduce transport-linked pollution in the past decade, implementing progressively more stringent norms for internal combustion (IC) engine emissions, from Bharat Stage (BS) III to BS IV to BS VI, the equivalent of Euro III, IV and VI; phasing out older vehicles; expanding the Metro Rapid Transport Service (MRTS) to new cities; diversifying fuel portfolios and popularising less-polluting fuels such as compressed natural gas (CNG) and liquefied natural gas (LNG).²¹ However, far more needs to be done. A strategic plan is necessary—one that is based on an estimate of the capital available, can be easily implemented, and will lead to practices that contribute to the curbing of pollution. A mechanism to ensure that every vehicle's pollution control certificate is regularly updated needs to be created.²²

The strategic plan should include measures to encourage the following:²³

1. Reduction of tail-pipe emissions by encouraging a switch to electric vehicles (EVs) and improving on-road management of polluting vehicles.
2. Shift to alternative forms of travel such as cycling or walking; use of carpooling and public transport.
3. Improved traffic engineering and better street design.
4. Improved last-mile connectivity to increase the reach of public transport and reduce private vehicle use.
5. Reduction of road congestion by spreading peak hours of travel across the day.

Public transport needs to be improved to discourage personal motorised travel. India only has 1.2 buses for every 1,000 people, for instance, while the global average is four. India requires even more than the global average, given its high population density.²⁴

India has launched the Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles in India (FAME) scheme under its National Mission on Electric Mobility. The second phase of the scheme, FAME-II, has been approved, which aims to deploy EVs on a large scale: about 7,000 buses, 55,000 passenger cars, 500,000 three-wheelers, and 1 million two-wheelers by the end of 2022. Two-wheelers and three-wheelers are responsible for a large part of transport-induced pollution in the country—61 percent of total petrol sales are to two-wheelers, while 28 percent of total diesel consumption is by three-wheelers. A 2018 study of the city of Bengaluru in Karnataka by TERI (The Energy Research Institute) showed that its three-wheelers emitted around 1,200 tonnes of carbon dioxide (CO₂), 0.5 tonne of PM10 and 4 tonnes of nitrogen oxides (NO_x) daily.²⁵

Other low-emission alternatives such as LNG and CNG can also be popularised further. The transition should be to a mix of low-emission technologies with eventual adoption of an Electric Vehicle (EV) fleet as the cost of batteries declines and the renewable energy contribution to the grid increases, while coal-based power use comes down.²⁶ Setting up an adequate number of charging stations is also a challenge due to their high initial investment cost, complex technical competencies needed, and certain software and hardware issues.²⁷ Even so, under FAME-II, charging infrastructure is being expanded.²⁸ What is needed is a policy thrust that promotes a mixture of schemes prioritising lower emissions.

Transition to Renewable Energy

A 2021 study by Harvard University showed that burning of fossil fuels—mainly coal, petroleum, and diesel—contributes to about 30 percent of deaths due to air pollution in India.²⁹ It found that the fossil fuel component of PM2.5 is mainly responsible for these deaths, and also contributes to extreme weather events and increased crop failure.

Technologies generating power from wind, geothermal and solar photo voltaic (PV) have proven effective in pollution abatement.³⁰ India has great potential as a green energy superpower with long-term focused policies and appropriate and targeted solutions. It has set itself a target of 175 gigawatts (GW) of renewable capacity by end-2022, which will include 100 GW of solar power. For 2030, the target is 500 GW.³¹ Solar power generation has been allocated ₹19,500 crore (US \$2500 million) in the 2022 union budget.³²

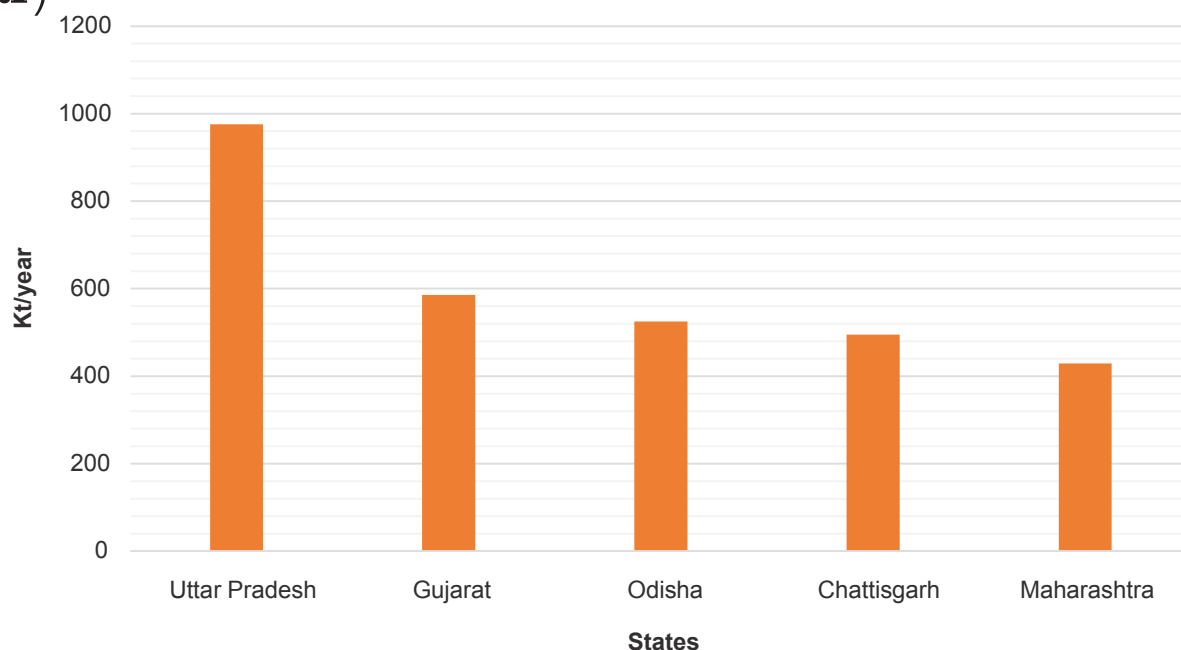
However, there remain many impediments to the growth of renewable energy in India. First, current policies need to be more stringently implemented. Second, financing remains a challenge. High interest rates of about 12-15 percent charged by financial institutions providing loans for solar and wind projects, coupled with the need to match the low tariffs of power generated from conventional sources, is impeding the growth of the sector.³³ India is also dependent on imports of solar modules, power storage batteries, and other components of the renewable energy system.³⁴

Strategies and interventions are required to provide an impetus to the renewable energy sector. While India receives an annual investment of approximately ₹1,00,000 crore (US \$ 10-15 billion) in renewable energy, what is required is almost double this amount to deploy renewable energy.³⁵ Small companies and start-ups need state support to grow.³⁶ Decentralised installation of renewable energy is imperative to achieve the 2030 RE targets.³⁷ For example, rooftop solar has huge potential but is ridden with multiple problems, especially when it comes to the distribution companies (discoms). A main obstacle is the net metering vs gross metering regulations. With net metering, surplus power produced by the rooftop solar system goes back to the grid, due to which the discoms are liable to compensate the consumers for this surplus against their electricity bills.³⁸ They then tend to lose their high-paying consumers, making them reticent to adopting the rooftop solar segment.³⁹ Emphasis on improving technology is important, as well as synergies between policymakers and the industry operators. Lastly, the discoms play an important role in increasing and providing impetus to the use of renewable energy.⁴⁰

Inter-State Coordination for Air-Quality Management

PM_{2.5} emissions in India are formed in both primary and secondary ways. The secondary pollutants spread faster and farther than the primary ones, travelling across states, cities and jurisdictional borders. The air pollution challenge is multi-sectoral and multi-jurisdictional. It has been often observed, for instance, that the sources of air pollution in the National Capital Region (NCR) include factors beyond its local limits. The effects of air pollution are felt well beyond their point of origin. Cities and states must therefore look beyond their immediate jurisdiction,⁴¹ and aim for regional-level initiatives.⁴²

Figure 3:
The Five Most Polluted Indian States with PM 2.5 (kt/year)



Source- Council on Energy, Environment and Water (CEEW) 2021⁴³

Air quality in a state depends on emissions both within the state and from upwind states. Every state is both a recipient of air pollution and a contributor to it. In addition, source-receptor relationships between states are seasonal and significant, with upwind regions contributing to much of a given area's pollution.⁴⁴

There are only a few existing formal mechanisms for India's cities, states or regions to work towards airshed pollution management. Improving airshed management requires first recognising that air pollution is trans-boundary. Airshed-based air quality management calls for an area-wide approach, setting standards, monitoring, and enforcement.⁴⁵

The NCAP's mitigation strategies also have drawbacks. Information on sources of emission is lacking, which has led to action plans being blindly replicated for different cities within states. State PCBs can audit and monitor industrial pollution levels, but are not empowered to levy penalties in case of non-compliance. They can only request compliance and penalties can be levied only by criminal courts, significantly limiting the power of SPCBs.⁴⁶ Lastly, there are no clear guidelines on regional coordination among states. For example, Delhi's action plan has an electric mobility policy for three-wheelers across the National Capital Region (NCR, an area which includes parts of the neighbouring states of Haryana, Uttar Pradesh and Rajasthan) but a lack of clear guidelines on the division of responsibilities between the concerned Delhi departments and the state PCBs, resulting in lapses in management.⁴⁷

In August 2021, Parliament passed the bill setting up the Commission for Air Quality Management (CAQM)⁴⁸ in the NCR and Adjoining Areas.^b It is designed as a collaborative and participatory mechanism that will involve relevant central ministries, state governments, local bodies, and other stakeholders in the region to tackle the problem of air pollution.

b The reference to 'Adjoining Areas' added parts of Punjab to the CAQM's jurisdiction, since a substantial part of Delhi's air pollution in winter is caused by farm stubble burning in Punjab.

However, the CAQM has achieved little so far. What is required is a short-term plan with time-bound annual targets for each city in the Delhi-NCR airshed. This would incentivise states to reach the targets.⁴⁹

The social and political facets of air pollution also need to be tackled. Technological interventions have not been enough. Degradation of air quality violates Article 21 of the Indian Constitution, which guarantees the right to life and personal liberty to all citizens.⁵⁰ It is imperative to view air pollution as a constitutional and political issue as well, rather than merely a technical one.⁵¹

Lastly, air pollution is generally perceived as an urban problem, with hardly any initiatives to alleviate rural pollution. The NCAP has little focus, if at all, on air pollution outside the non-attainment cities. Of the 804 manual and 286 real-time air quality monitoring stations in India, only 26 are located in rural districts.^{52,53} Pollution being a trans-boundary phenomenon, it is imperative to acknowledge its impact on rural areas, too.

A study by the Indian Institute of Technology (IIT), Delhi, found that if just three current government programmes are properly implemented, it would not only bring down air pollution but also generate power surplus of 3-8 terawatt hours a year. These are the Pradhan Mantri Ujjwala Yojana (PMUY), which seeks to provide an LPG gas connection in every home, thereby reducing pollution from burning firewood and other domestic sources; the Deen Dayal Upadhyay Grameen Jyoti Yojana (DDUGIY), aimed at full rural electrification, which would remove the need to use kerosene for lighting; and the NCAP.

Conclusion

There are multiple dimensions to India's air pollution crisis. Policymakers, investors, and civil society need to come together to combat it. Decoupling air pollution from the broader discourse of climate change is also important for a shift to a targeted and more nuanced mitigation strategy.

Success will depend on adequate and targeted financing, tapping the right industries, proper execution of policies, collaboration, coordination, and knowledge sharing. The battle involves multiple stakeholders and approaches. It cannot be won overnight, but it is imperative to engage in it effectively and immediately. [ORF](#)

Endnotes

- 1 L.S. Kurinji, “International Day of Clean Air — 5 Facts You Should Know About Air Pollution in India.” *Council on Energy, Environment and Water*, September 6, 2021, <https://www.ceew.in/blogs/five-striking-facts-about-air-pollution-crisis-in-india>.
- 2 “India Air Quality Index (AQI) and Air Pollution Information *IQAir*,” <https://www.iqair.com/in-en/india>.
- 3 Anamika Pandey, Michael Brauer, Maureen L Cropper, Kalpana Balakrishnan, Prashant Mathur, Sagnik Dey, Burak Turkgulu, et al, “Health and Economic Impact of Air Pollution in the States of India: The Global Burden of Disease Study 2019.” *The Lancet Planetary Health* 5 (1): e25–38. [https://doi.org/10.1016/S2542-5196\(20\)30298-9](https://doi.org/10.1016/S2542-5196(20)30298-9).
- 4 “India Air Quality Index (AQI) and Air Pollution Information.”
- 5 “India Air Quality Index (AQI) and Air Pollution Information”
- 6 Tanushree Ganguly, Adeel Khan, and Karthik Ganesan, “What’s Polluting India’s Air? The Need for an Official Air Pollution Emissions Database.” New Delhi: *Council on Energy, Environment and Water*, 2021, <https://www.ceew.in/publications/sources-of-air-pollution-in-india-and-need-for-official-air-pollution-emissions-inventory>.
- 7 Ministry of Environment, Forest and Climate Change, Government of India, “National Clean Air Programme 2019.” https://moef.gov.in/wp-content/uploads/2019/05/NCAP_Report.pdf
- 8 Natural Resources Defence Council, Indian Institute of Public Health, “Clearing the Air: A Review of City Actions to Fight Air Pollution in India.” *NRDC*, 2021 <https://www.nrdc.org/resources/clearing-air-review-of-city-actions-to-fight-air-pollution-india>.
- 9 “Clearing the Air: A Review of City Actions to Fight Air Pollution in India, 2021”
- 10 Anumita Roychowdhury, “Funds for Clean Air: Get the Blueprint Right.” 2020. <https://www.downtoearth.org.in/blog/pollution/funds-for-clean-air-get-the-blueprint-right-74122>.
- 11 “Clearing the Air: A Review of City Actions to Fight Air Pollution in India.”
- 12 “Clearing the Air: A Review of City Actions to Fight Air Pollution in India.”
- 13 Rowchowdhury “Funds for Clean Air: Get the Blueprint Right.” 2020.
- 14 Shivnarayan Rajpurohit, “What Happened to Modi’s National ‘Clean Air’ Project? Not Much in Three Years.” *NewsLaundry*, March 6, 2022, <https://www.newsLaundry.com/2022/06/03/what-happened-to-modis-national-clean-air-project-not-much-in-three-years>.

- 15 Rowchowdhury “Funds for Clean Air: Get the Blueprint Right.”
- 16 Jessica Seddon, “Clean Air for All: Financing Clean Air in India, Report to the XVth Finance Commission, Government of India.” *World Resources Institute*, 2019, https://fincomindia.nic.in/writereaddata/html_en_files/fincom15/StudyReports/WRI_summary_report.pdf
- 17 Seddon, “Clean Air for All: Financing Clean Air in India, Report to the XVth Finance Commission”
- 18 Clearing the Air: A Review of City Actions to Fight Air Pollution in India.”
- 19 S Kumar, N Yadav, S Das and S Mathew, Green Vehicle Rating for 2 and 3 Wheelers in India. New Delhi: *Alliance for an Energy Efficient Economy*, 2018, https://shaktifoundation.in/wp-content/uploads/2018/08/GVR-Report_Final.pdf
- 20 Abhinav Soman, Harsimran Kaur, Himani Jain, and Karthik Ganesan. “India’s Electric Vehicle Transition: Can Electric Mobility Support India’s Sustainable Economic Recovery Post COVID-19?” New Delhi: *Council on Energy, Environment and Water*, 2021, <https://www.ceew.in/publications/indias-electric-vehicle-transition-0>
- 21 Haseeb Hakkim, Ashish Kumar, Baerbel Sinha and Vinayak Sinha, “Air Pollution Scenario Analyses of Fleet Replacement Strategies to Accomplish Reductions in Criteria Air Pollutants and 74 VOCs over India.” *Atmospheric Environment: X* 13 (January 2022): 100150, <https://doi.org/10.1016/j.aeaoa.2022.100150>.
- 22 Madhav Pai. “Tackling Transport Emissions.” *WRI INDIA*. 2021, <https://wri-india.org/blog/tackling-transport-emissions>.
- 23 Pai, “Tackling Transport Emissions.”
- 24 Sharif Qamar, “Don’t Miss the Bus: Providing Sustainable Mobility for Urban India,” *The Energy and Resources Institute*, 2020, <https://www.teriin.org/infographics/dont-miss-bus-providing-sustainable-mobility-urban-india>.
- 25 Palak Thakur and Sugandha Pal, “Replacing Bengaluru’s Auto Fleet with Electric Autos Will Clean up the Air and Save LPG,” *The Energy and Resources Institute*, 2018, <https://www.teriin.org/article/replacing-bengalurus-auto-fleet-electric-autos-will-clean-air-and-save-lpg>.
- 26 Promit Mookherjee and Kushan Mitra, “Electric Buses in India: Emerging Issues and Policy Lessons,” *Observer Research Foundation*, 2022, https://www.orfonline.org/wp-content/uploads/2022/03/ORF_PolicyReport_Electric-Buses.pdf
- 27 Abhishek, “Cost of Setting up an EV Charging Station in India.” *Inverted Energy* (blog), December 24, 2021, <https://inverted.in/blog/cost-of-setting-up-an-ev-charging-station-in-india>.
- 28 Ministry of Heavy Industries, Government of India. “Brief: National Automotive Board (NAB),” https://fame2.heavyindustries.gov.in/content/english/13_1_brief.aspx.
- 29 Karn Vohra, Alina Vodonos, Joel Schwartz, Eloise A. Marais, Melissa P. Sulprizio, and Loretta J. Mickley. “Global Mortality from Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion: Results from GEOS-Chem.” *Environmental Research* 195 (April 2021): 110754, <https://doi.org/10.1016/j.envres.2021.110754>.
- 30 Christer Ågren, “Renewable Energy – Technology Choices Matter for Air Quality,” *Airclim*, March 1, 2020, <https://www.airclim.org/acidnews/renewable-energy-%E2%80%93-technology-choices-matter-air-quality>.

- 31 Anoop Jaipurkar, “India on Path to Meet Renewable Energy Target in 2030, but Hurdles Remain,” *The Federal*, November 22, 2021, <https://thefederal.com/cop26-impact/india-on-path-to-meet-renewable-energy-target-in-2030-but-hurdles-remain/>.
- 32 Harshita Tyagi, “Union Budget 2022: PLI Scheme Extended to Solar Equipment; Allocates Rs 19500 Cr Boost for Modules,” *Financialexpress* (blog), 2022, <https://www.financialexpress.com/budget/union-budget-2022-pli-scheme-extended-to-solar-equipment-allocates-rs-19500-cr-boost-for-modules/2422284/>.
- 33 Nandini Jhalani, “India Looks Likely to Miss the 2022 Renewable Energy Targets,” *Mongabay-India*, June 3, 2021, <https://india.mongabay.com/2021/06/india-looks-likely-to-miss-the-2022-renewable-energy-targets/>.
- 34 Jhalani, “India Looks Likely to Miss the 2022 Renewable Energy Targets.”
- 35 “Only decentralised renewable energy can help achieve 2030 targets,” *Business Standard*, July 21, 2022, https://www.business-standard.com/article/economy-policy/only-decentralised-renewable-energy-can-help-achieve-2030-targets-experts-122072100154_1.html
- 36 “India Looks Likely to Miss the 2022 Renewable Energy Targets.”
- 37 “Only decentralised renewable energy can help achieve 2030 targets.”
- 38 Binita Das “ Rooftop Solar : Why India is now considered to be a laggard globally,” *DownTo Earth*, January 12, 2022, <https://www.downtoearth.org.in/blog/energy/rooftop-solar-why-india-is-now-considered-to-be-a-laggard-globally-81090>
- 39 “Difference between gross metering and net metering” *Centre for Energy Finance, Council on Energy Environment and Water*, July 16, 2019, <https://www.ceew.in/cef/masterclass/explains/difference-between-gross-metering-and-net-metering>
- 40 Manish Kumar, “Discoms and states pivotal to make renewable energy via open access a success,” *Mongabay*, July 4, 2022, <https://india.mongabay.com/2022/07/discoms-and-states-pivotal-to-making-renewable-energy-via-open-access-a-success/>
- 41 World Health Organisation. 2021. “Catalyzing Clean Air in India.” *World Bank*. 2021, <https://www.worldbank.org/en/country/india/publication/catalyzing-clean-air-in-india>.
- 42 Bobins Abraham, “Everything You Need to Know About the Commission for Air Quality Management in NCR Bill 2021,” *Indiatimes*, August 5, 2021, <https://www.indiatimes.com/explainers/news/commission-for-air-quality-management-in-ncr-bill-2021-all-you-need-to-know-546482.html>.
- 43 Tanushree Ganguly, Adeel Khan, and Karthik Ganesan. 2021. “What’s Polluting India’s Air? The Need for an Official Air Pollution Emissions Database,” New Delhi: *Council on Energy, Environment and Water* 2021, <https://www.ceew.in/publications/sources-of-air-pollution-in-india-and-need-for-official-air-pollution-emissions-inventory>.
- 44 “Clean Air for All: Financing Clean Air in India, Report to the XVth Finance Commission, Government of India.”
- 45 “Clean Air for All: Financing Clean Air in India, Report to the XVth Finance Commission, Government of India.”
- 46 Tanushree Ganguly, Kurinji L. Selvaraj, and Sarath K. Guttikunda. 2020. “National Clean Air Programme (NCAP) for Indian Cities: Review and Outlook of Clean Air Action Plans.” *Atmospheric Environment: X* 8 (December): 100096, <https://doi.org/10.1016/j.aeaoa.2020.100096>.

- 47 “National Clean Air Programme (NCAP) for Indian Cities: Review and Outlook of Clean Air Action Plans.”
- 48 Ministry of Law and Justice, Government of India. “The Commission for Air Quality Management in National Capital Region and Adjoining Areas Act, 2021.” <https://caqm.nic.in/WriteReadData/LINKS/The%20Commission%20for%20Air%20Quality%20Management%20in%20NCR%20&%20Adjoining%20Areas%20Act,%20202176b7d650-cba2-4414-b357-520732cc119f.pdf>
- 49 Reena Gupta, “To Tackle Air Pollution, Devise Concrete, Measurable Time-Bound Targets,” *Hindustan Times*, January 31, 2022, <https://www.hindustantimes.com/opinion/to-tackle-air-pollution-devise-concrete-measurable-time-bound-targets-101643634509364.html>.
- 50 G Darsini, Indira Priya, and K. Uma Devi, “Article 21 of Indian Constitution- A Mandate to Pollution Free Environment,” *Legalserviceindia*, <https://www.legalserviceindia.com/article/l399-A-Mandate-To-Pollution-Free-Environment.html>.
- 51 Aishwarya Shrihari, “Delhi Pollution: Looking at Social, Political Facets of Climate Crisis Can Help in Better Adaptation,” *DownToEarth*, December 9, 2021, <https://www.downtoearth.org.in/news/governance/delhi-pollution-looking-at-social-political-facets-of-climate-crisis-can-help-in-better-adaptation-80614>.
- 52 “International Day of Clean Air — 5 Facts You Should Know About Air Pollution in India.”
- 53 Swagata Dey, “Air Pollution in Rural India: Ignored but Not Absent,” *DownToEarth*, February 3, 2021, <https://www.downtoearth.org.in/blog/pollution/air-pollution-in-rural-india-ignored-but-not-absent-75341>.

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