NATIONAL CLEAN AIR PROGRAMME

AN AGENDA FOR REFORM

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Why this spotlight?

The National Clean Air Programme (NCAP) was launched by the Ministry of Environment, Forest and Climate Change (MoEFCC) in January 2019. This national programme is the first ever effort to set clean air targets for 131 cities designated as non-attainment cities due to consistently high particulate levels exceeding the National Ambient Air Quality Standards (NAAQS). These cities are required to reduce particulate concentration by 20–30 per cent by 2024 from the base year of 2017. This target has been further revised to achieve up to 40 per cent reduction by 2025–26 with respect to the base year of 2019–20.[1]

A lot of money has flowed in to fund clean air action plans. This is also the first ever instance of performance-linked funding for improving air quality. Cities have to demonstrate improvement in air quality to access this fund. There are three key approaches to this fund flow: I) Fund allocated by MoEFCC to 82 cities under the NCAP programme; ii) Direct funding from the 15th Finance Commission (XV-FC) grant to the 42 cities and seven urban agglomerations with more than a million population, also called the Million-Plus Cities Challenge Fund; and iii) Accounting of the convergence funding, i.e. alignment of separate funds for sectoral schemes to deliver on clean air objectives.

As much as Rs 19,711 crore has been earmarked for 131 cities for the period of FY 2019–20 to 2025–26, as stated in the 2023–24 MoEFCC report. Out of this, about Rs 3,172.00 crore has come to 82 cities under the NCAP programme and about Rs 16,539.00 crore to 42 million-plus cities and seven urban agglomerations under the XV-FC grant.

Initially, 102 cities were designated as non-attainment. Subsequently, 22 more cities were added to this list. Of these, 42 are million-plus cities or urban agglomerations. Among these 42 million-plus cities, 34 cities are included in the NCAP list of non-attainment cities. Additionally, eight new cities, all million-plus but not non-attainment cities, were included in the programme. Later, Asansol and Raniganj were combined into a single entity, resulting in a final count of 131 non-attainment cities. The eight new million-plus cities include Faridabad, Meerut, Chennai, Vasai–Virar, Jabalpur, Ranchi, Jamshedpur and Rajkot. Under NCAP, annual targets have been given by CPCB to 82 cities for reduction in PM10 concentrations by 3–15 per cent, aiming for an overall reduction of up to 40 per cent by 2026. Additionally, 49 cities under the XV-FC air quality grant have been assigned an annual target to reduce PM10 concentrations by 15 per cent and increase the number of good air quality days—Air Quality Index (AQI) below 200.[2]

While NCAP funding is channelized through state pollution control boards (SPCBs) to the concerned departments, the XV-FC funding is routed through state finance ministries and subsequently to urban local bodies (ULBs). The funding is performance linked. Though the criteria for performance assessment have been evolving over time, currently it requires cities to demonstrate improvement in ambient PM10 levels. Additionally, XV-FC cities must also show an increase in the number of good air days (AQI below 200). The financial allocation is a performance-based supplemental grant for funding of activities approved under the city action plans and city micro action plans.

Cities are also expected to report progress under other sectoral schemes and programmes that are funded by the Central government or state governments. These are classified as convergence funding—the idea being that all relevant sectoral schemes need to be aligned to deliver on clean air indicators.

As of now, 24 states and Union Territories (UTs) have prepared state action plans and 131 cities have prepared city action plans. At the national level, the MoEFCC is also seeking to create a national level action plan that will seek convergence of schemes and programme of seven line ministries including Ministry of Power (MoP); Ministry of Road Transport and Highways (MoRTH); Ministry of Housing and Urban Affairs (MoHUA); Ministry of New and Renewable Energy (MNRE); Ministry of Petroleum and Natural Gas (MoPNG); Ministry of Heavy Industries (MHI); and Ministry of Health and Family Welfare (MoHFW).

As two years remain for the current programme to end, it becomes necessary to understand the experience so far, the lessons from this phase of implementation, its effectiveness in meeting the objective of clean air, and the scope of its scalability and replicability.

Given the nation-wide air pollution and associated public health challenges, this programme needs strengthening at the national as well as state levels for deeper institutionalization and resource mobilization for upscaled multi-sector action. To enable sustained action and its funding, it is necessary to tap the learning curve from the ongoing phase of implementation.

The MoEFCC has initiated discussions with state governments regarding the next phase of funding. It is proposing to establish an Air Quality Challenge Fund under the NCAP programme, which is to be allocated to cities based on their population and pollution load. The initiative may require cities to commit to mitigating air pollution by fulfilling specific criteria for implementation of prescribed sectoral

action. Distribution of funds is expected to happen based on performance against annual air pollution reduction targets. The criteria will combine added reform-based challenges. Any future funding initiative therefore requires tapping of the learning curve so far.

Several critical issues need to be understood. These include effectiveness of the metrics adopted for assessing performance-linked funding in cities; capability and preparedness of the cities to frame the scope of action and coordinate implementation of multi-sector action plans; institutional capability at the departmental level to define the full scope of action that can make a difference; mainstreaming of clean air indicators in the planning and budgetary allocation of the departments; effective alignment of parallel programmes, schemes and their funding lines to achieve convergence and delivery on clean air objectives; streamlining of standard operating procedures, regulatory processes and data protocols for tracking actions and performance; and development of a more effective interface between local-city-state-national policies and interventions for effective impact. If these are not fully addressed, funding and planning may remain sub-optimal. The spotlight therefore is on the metrics for assessing performance of the cities.

While significant amounts of funds have been released to cities for clean air action, the level of utilization is not up to the mark and utilization is a lot less in NCAP cities compared to XV-FC cities. According to the Sixteenth meeting of the Implementation Committee for National Clean Air Programme held in May 2024, an amount of approximately Rs 10,566.47 crore was released to the 131 cities between FY 2019–20 and FY 2023–24 (till 03 May 2024) under both NCAP programme and XV-FC.[3]

Overall utilization of funds falls short of target. The 82 NCAP cities have utilized only Rs 831.42 crore out of Rs 1,615.47 crore released until 03 May 2024, which is only 51 per cent. The 42 cities and seven urban agglomerations have utilized Rs 5,974.73 crore out of Rs 8,951 crore, which is about 67 per cent. This indicates that the scale and speed of action are yet to catch up.

Clearly, utilization of the available funding falls short of the targets—more so in the smaller NCAP towns. It is therefore necessary to understand what is slowing down fund absorption, how the money is being spent, and the gaps in planning and implementation.

To enable performance-linked funding, the Central Pollution Control Board (CPCB) has set up a monitoring and reporting mechanism. This has also been

directed by the National Green Tribunal (NGT). The CPCB has provided a detailed sector-wise indicator to track progress. All concerned cities are expected to report progress against each of these indicators every quarter.

These indicators cover multiple sectors that include air quality monitoring; pollution source assessment; public outreach on air quality; road dust, construction and demolition (C&D) waste; solid waste management; industry; and vehicular pollution that includes on-road and old vehicles, public transport, non-motorized transport, parking and freight. The total number of indicators add up to about 258. These are distributed as follows—capacity building, monitoring network and source apportionment (related to air quality): 12; public outreach: 7; road dust: 23; waste and biomass which includes municipal solid waste: 33; construction & demolition: 13; vehicles: 42; industries: 119; air quality data: 9.

The cities are required to report progress in action directly on the Portal for Regulation of Air-pollution in Non-Attainment cities (PRANA) created by the CPCB. This portal is a single-window platform that provides real-time information on city-wise pollution levels and actions. SPCBs and ULBs have direct access to the PRANA portal for reporting purposes. The information filed in the PRANA portal is the basis of performance evaluation.

Every quarter, cities are required to coordinate to provide the status of action on each of the targets on the PRANA portal; indicate progress against targets for each indicator; state the deviation from the targets (if any); and provide details on funds allocation, fund released and utilized, and fund requirements for implementation of each action. Cities are required to provide supportive material, evidence and information as attachments for verification of action. This elaborate process requires a systemic response.

While under the NCAP programme, cities need to demonstrate improvement in PM10 levels to access funds, there is yet another parallel programme of Swachh Vayu Survekshan (SVS) that was introduced by the MoEFCC in 2022 to rank cities based on the level of policy measures implemented. These cities (classified based on population—above 10 lakh plus population, above 3–10 lakh population and under 3 lakh population) are ranked based on policy measures implemented in multiple sectors including biomass, municipal solid waste, road dust, dust from construction and demolition waste, vehicular and industrial emissions, other emissions, public awareness, and improvement in PM10 concentration. All NCAP cities are assessed under the SVS as well based on a scoring framework and information provided by the cities/ULBs on the PRANA portal every financial year.

For the purpose of this ranking under SVS, weightages have been attributed and quantitative performance targets have been set for each sector. This framing is important to drive implementation and deepen the scope of action while improving compliance.

While these assessment frameworks are steps in the right direction, there are serious questions about the metrics used to benchmark progress in cities and their implications for real improvement. Under the different programmatic approaches of NCAP, XV-FC and SVS, the cities are judged based on different metrics.

The effectiveness of ranking and performance evaluation will depend on the method of assessment; benchmarks considered for tracking progress in each sector that defines the nature, scope and scale of action; ability of the states to design action that can make a difference; the uniform spread and deepening of priority action across all key sectors; and the tracking method for air quality improvement.

From this perspective, the Centre for Science and Environment (CSE) has carried out this rapid review of the performance-linked planning and funding for NCAP to understand the gaps and further needs for a more robust and expanded programme.

However, a comprehensive assessment becomes challenging as the information on PRANA portal is not easily accessible for a systematic review of sector-wise measures implemented in all cities; the generation of requisite information by departments for reporting; the addressing of missing links in programme planning; designing and infrastructure development; reforming regulatory measures and enforcement strategies; mobilizing technical support; and allocating resources across sectors, among others. Such extensive city-wise information is needed to understand the scope of the action and how this correlates with air quality changes.

Therefore, this review relies on the limited snapshots of information accessible from the PRANA portal since the year 2021, direct engagement with the stakeholder departments in cities, and additional information submitted by cities/states in affidavits to the Supreme Court or to the NGT. This is not an exhaustive and systematic review of all NCAP cities but provides indicative lessons from the snapshot of information available from cities.

Given the significance of this programme in cleaning up the air, stronger support for more effective clean air measures is needed in the coming years. Air pollution has emerged as a serious public health concern. The recently released State of Global

Air 2024 report by the US-based Health Effects Institute (HEI) in collaboration with the Institute for Health Metrics and Evaluation's Global Burden of Disease (GBD) project states that with a population over one billion, India has a large disease burden associated with air pollution. India has recorded 2.1 million deaths due to air pollution. Moreover, in 2021, nearly 50 per cent of all ozone-related chronic obstructive pulmonary diseases (COPD) deaths were in India (237,000 deaths). Toxic air has made children very vulnerable. This requires urgent and nation-wide action to reduce public health risk.

Highlights of the findings

Why do we need the NCAP framework?

Even before the reform agenda for the NCAP is outlined, it is necessary to understand the need for such a framework. The NCAP has emerged from a recognized need for a national framework for air quality management with a compliance strategy. Even though the Air (Pollution and Control of Pollution) Act, 1981, and the National Ambient Air Quality Standards (NAAQS) have been in existence for a considerable length of time, there was never a clear executive strategy for nation-wide air quality management to enable meeting of the NAAQS across all regions. Only sectoral emissions regulations have evolved but without a cohesive strategy to improve ambient air quality by linking a range of sectoral actions and solutions in cities and regions to meet the clean air targets.

This led to a considerable policy debate over the decades seeking adoption of global good practices in air quality management to meet the air quality targets. The legal framework for such an approach in several countries, including the US and Europe, were under scrutiny. For instance, in Europe the Air Quality Directive sets limits for the levels of various pollutants and corresponding margins of tolerance and time limits for compliance. Each European Union country is required by the Air Quality Directive to define 'zones' and 'agglomerations' to which pollutant limits will apply. There is an absolute obligation on member states to ensure that the limits and margins of tolerance for air pollutants are not exceeded in any zone or agglomeration after the deadline.

Similarly, in the US, the areas that did not meet the US National Ambient Air Quality Standards and violated their Clean Air Act requirements were given time-bound air quality targets. According to this practice that is still underway, the states prepare State Implementation Plans that propel the adoption of emission reduction measures across key sectors of pollution to meet the clean air targets. This is backed by a funding strategy and penal action for non-compliance. The national framework is driven locally by this bottom-up planning process.

Technically, the NCAP is thus the first ever national strategy for air quality management that principally hinges on good practice principles which ask for identification of non-attainment areas to require implementation of area-wise and pollution source-wise action to meet the predefined clean air targets and is supported by targeted funding, and a monitoring and evaluation framework to link performance with funding.

Such an umbrella approach is expected to create a region-wise and sector-wise mandate for action at local/state levels. This can help to leverage and converge the requirements of national air quality legislations and sectoral policies and regulations/laws and state-level policies/programmes/schemes for implementation, while also enabling locally driven action based on local imperatives.

This is helping to push the system towards creating a sectoral mandate for clean air action which was nearly non-existent earlier. For instance, there are several pollution sources like vehicles, that are largely administered under different legislation and are not directly aligned with the requirement of the Air Act under the conventional business rules, even though Air Act has provisions on vehicles. Similarly, emissions from waste, construction and solid fuels for cooking, among others, that have direct bearing on air quality are not directly and explicitly linked with clean air objectives in sectoral policies and programmes. Even though their sectoral rules and policies are grounded in the principles of resource efficiency and sustainable management, their scale and speed of action may not directly be driven by clean air targets. Therefore, the national framework has the potential to strengthen this mandate and linkage for each of these sectors. Sectoral action cannot be isolated from the comprehensive clean air framework.

Similarly, the experience so far has shown that the NCAP framework has helped to create the requirements of multi-sector and multi-department participation in clean air action that was missing earlier. The feedback from cities shows that there is a strategic shift in which multiple departments across sectors are now planning and participating to report on clean air action, which was not the practice earlier. However, institutional inertia and legacy pressures of conventional practice have delayed effective absorption and delivery of these requirements. But now that the process has started, this needs to be taken forward for effective alignment and tagging of clean air indicators with sectoral programmes and funding more deliberately and explicitly.

The NCAP has also created the obligation to strengthen the science for air quality management. Over the last few years, considerable efforts have gone into assessing pollution sources in targeted cities to inform the clean air action plans. This has catalysed generation of local data and evidence that was also a critical missing link. The NCAP has also enabled expansion of air quality monitoring to generate data in several data shadow areas to track air quality for compliance. This has the potential to be strengthened further. In fact, this has kindled interest among state pollution control boards (SPCBs) to consider innovative approaches for assessing air quality including satellite-based mapping of pollution across regions.

The fact that NCAP requires a reporting mechanism to track sectoral progress and implementation on ground across multiple sectors—however inadequate it might be at this moment—has been accepted and the practice has evolved in cities. Nearly all sectoral departments that earlier had no mandate or experience to take on deliberate action that have bearing on air quality and report accordingly, are now beginning to adapt to the new change.

The last five years have witnessed some of these nascent changes. There are also emerging good practices that are getting reported from different sectors across cities. There are several institutional process outcomes at the city levels. But the scale and speed of action and on-ground outcomes are still limited. Yet, given the urgency of the air pollution related health crisis, the scale of on-ground multi-sector action must speed up. This requires deeper engagement on the ways to further improve the state-level planning strategy and a stronger linkage with the sectoral action that can work in a continuum to make this national programme more effective. Sectoral action needs to be aligned with the clean air framework. While the recipe of change is in place, the method, format and approach to NCAP implementation requires an evaluation to understand the gaps that are slowing down the pace and effectiveness of change. This assessment is therefore an effort to understand the way forward to make NCAP a stronger propeller of transformation.

PM10 based performance-linked funding is locking in more resources for dust control

Even though the NCAP programme was originally planned to reduce both PM10 and PM2.5 concentrations in non-attainment cities, in practice, only PM10 concentration is being considered for performance assessment. PM10 is the coarser fraction of the particles and is largely influenced by wind-blown dust. But PM2.5, that is a tinier sub set of PM10 and more harmful fraction emitted largely from combustion sources, gets neglected. PM2.5 poses a greater health risk as it penetrates deeper into the lungs, entering the bloodstream and affecting nearly all organs.

One of the reasons for the initial focus on PM10 was the inadequate PM2.5 monitoring network across the 131 non-attainment cities. However, the situation has changed considerably now. All million-plus cities under the XV-FC grant have PM2.5 monitors and can immediately graduate to PM2.5 linked performance funding.

This focus on PM10 is impacting the sector-wise spending under NCAP and XV-FC grants. Review of the spending under NCAP shows that as much as 64 per

cent of the total funds have gone into road paving and widening, pothole repair, water sprinkling, mechanical sweepers, etc. Comparatively, much lesser funds have been allocated for combustion sources that emit more harmful pollutants—only 14.51 per cent of total funding for controlling biomass burning, 12.63 per cent for vehicular pollution and a mere 0.61 per cent for industrial pollution control. The primary focus of the funding is thus road dust mitigation.

Tying up such enormous amount of funds only for road dust control can make the interventions for controlling toxic emissions from combustion sources sub-optimal.

Some of the combustion sources including waste burning and vehicles are getting partially addressed through the convergence funding i.e., funding earmarked for specific sectoral schemes for waste management programmes like Swachh Bharat Mission (SBM 2.0), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart City programme, Faster Adoption & Manufacturing of Electric Vehicles in India (FAME-II), etc. While this is an important strategy to align action and spending across sectors around the clean air indicators, the dedicated funding for NCAP and XV-FC grants needs to be linked with more priority measures across transport, industry, waste and use of solid fuels.

Most of the emissions inventory and source apportionment studies carried out in cities that assess the relative contribution of pollution sources to the ambient air quality, show a high share of road dust that can also be carrier of toxic substances. Therefore, road dust control needs to be part of the efforts but not overwhelm the efforts.

Moreover, the results of the source apportionment and inventories also need to be understood along with a wider set of scientific criteria. Air pollution science has matured considerably in this regard. Report of the Steering Committee on Air Pollution and Health Related Issues, Ministry of Health and Family Welfare (MoHFW) stated in 2015 that ambient concentration is not a good surrogate for total air pollution related to public health risk and cannot indicate exposure and health outcomes. It is the proximity and duration of exposure to the pollution source, and inhalation of pollutants that determine the health risk. Therefore, along with pollution concentration management, human exposure management becomes important. Studies such as those carried out by the US based Health Effect Institute show the differentiated health impact of particulate matter. For instance, particles from coal and diesel combustion are more harmful than windblown dust. The World Health Organization (WHO) has emphasized on the need for regulating tinier particles.

Going forward, the impact of policy action on PM10 levels will be more difficult to establish, as it is also highly impacted by wind-blown dust from outside the city, loose sub-soil from farmlands, and dust storm events. However, PM10 is released largely by specific dust sources like mining and construction. Therefore, the focus on PM10 monitoring should be more source-specific. Currently, the WHO is assessing the ways to address and account for dust and dust events that are of different nature.

Make PM2.5 the benchmark for performance-linked funding

PM2.5 is a more relevant health indicator to assess improvement in air quality. As an immediate strategy, performance assessment for all million-plus cities should be linked with PM2.5. All these cities have real-time monitors for PM2.5 data generation. That is the reason why these cities are also required to show increase in good air quality days as per the AQI that is estimated based on real-time data.

From a public health perspective, the focus must be on the more harmful PM2.5. The review of the available PM2.5 source apportionment studies from different cities shows that the contribution of road dust to PM2.5 concentration can be high in northern cities but in most cases contribution of combustion sources to PM2.5 concentration—including industry, vehicles and waste burning—is substantial.

Equally important to note is the share of secondary pollutants formed from nitrogen oxides, sulphur di-oxide and other gases. During the winter, when pollution levels peak in nearly all cities, the share of road dust reduces significantly while that of combustion sources increases dramatically. In the overall PM2.5 concentration, the share of secondary particulate can be considerably high. In Delhi, it can be as high as 30 per cent during winter. The regulatory focus needs to shift towards PM2.5 now to mitigate emissions from combustion sources including industry, vehicles, open burning, solid fuels for cooking, incineration, DG sets, etc.

While setting targets for PM2.5 reduction for cities ensures a larger clean up across the region and the airshed, as is the global good practice, both PM2.5 and secondary particulate matter are influenced by the transboundary movement of pollution across the regional airshed. This therefore needs a strong interface between city and state-level clean air action plans to meet both local and regional air quality targets.

Most of the future expansion of the air quality monitoring grid will happen based on real-time monitoring. This creates an opportunity to make PM2.5 the basis of benchmarking progress in air quality in all cities. If this is not corrected,

a significant part of the spending and efforts will get diverted from the critical sources of toxic emissions like industry and vehicles.

Incentivize effective action—currently, cities ranked high for improving PM10 levels may not necessarily rank high for implementing policy measures, so this must match more explicitly

The cities that score high for taking sectoral action under SVS can paradoxically be the worst performing cities for not improving PM10 concentration under the NCAP and XV-FC grant ranking. There is no way to establish the link between action and improvement in PM10 levels. The comparison of the two systems (PM10 improvement in NCAP, XV-FC cities and level of action along with the PM10 improvement under SVS) shows that they do not always correspond.

For instance, in 2022–23, Agra, Delhi, Ghaziabad, Meerut and Jabalpur performed well under SVS in the applicable population category of more than 10 lakh population but performed poorly under NCAP and XV-FC category for reducing PM10. Delhi ranked 9th under SVS for implementing policy measures but is at the bottom, scoring zero, under NCAP assessment for not improving PM10 levels. Among the 3 to 10 lakh population category, Amravati, Guntur and Rajahmundry are the best performers for taking action under SVS but are at the bottom, scoring zero, under NCAP assessment. Based on the population category of below 3 lakh, cities like Kala Amb, Angul and Talcher ranked at the top under SVS for taking action but at the bottom under NCAP category.

However, there are several cities that have performed well both under the SVS as well as under the NCAP/XV-FC verticals. For instance, in 2022–23, Indore, Srinagar, Bhopal and Trichy (population category of more than 10 lakh population) ranked best under both SVS and NCAP/XV-FC assessments. Similarly, Moradabad, Firozabad, Ujjain and Bareilly (3 to 10 lakh population category) are at the top under both SVS and NCAP. Among the smaller cities (population less than 3 lakh), Parwanoo and Raebareli are at the top under both SVS and NCAP assessments. There is no clear pattern.

It is not to say that the local action will lead to directly proportionate reduction in the overall ambient concentration and help to meet the clean air target. That may not happen as the local air quality is also influenced by transboundary movement of all key pollutants. Yet there has to be scalable local multi-sector action for substantial reduction in ambient concentration and exposures.

Both the verticals therefore require more detailed presentation of information on the scale and scope of implementation of the action to assess adequacy of action to make an impact. It is quite likely that some cites may have taken more progressive and innovative steps to clean up the air but the scale of action may not be commensurate with the target reduction. This feedback can help to define the scope of resource mobilizing and scale of action needed at the city level and at the airshed level to make a difference.

On the other hand, there can be large variability in annual PM10 levels due to meteorological factors. The annual PM10 levels may reduce or increase due to dust events and impact of other windblown dust sources. This may not adequately mirror the impact of action across all key sectors including industry, transport, waste and solid fuels on PM10 levels. Annual changes in PM10 can be highly influenced by meteorology, dust storms and heatwaves.

It is therefore necessary to demonstrate the scale and nature of action needed in targeted sectors to achieve effective reduction in pollution concentration. Not enough details are available about the scale and depth of policy measures implemented in cities and the larger region to understand what makes a difference to the air quality and why.

This needs to be addressed to avoid the risk of attributing success in reducing annual PM10 level inadvertently to meteorological and atmospheric changes. It is necessary to convey the scale and nature of action that are contributing to the air quality changes.

Improve the metrics to prioritize combustion sources that emit a range of toxic emissions and drive technology roadmap and design changes

With the current focus on dust control, the key combustion sources including transport, industry and use of solid fuels in households and open eateries often do not receive adequate priority to build ambitious pathways. Due to city-specific action and hard lines drawn around the municipal boundaries, most industrial sources and power plants remain outside the orbit of the city action plans. The small- and medium-scale units that exist in the non-conforming areas of cities are often not considered.

Rapid review in states shows that these sectors face the maximum challenge in accelerating action more holistically. Diversity of issues like lack of well-funded specific schemes to support action, technology transformation and design

changes, and the complexity of new generation policies, are slowing down action in these sectors.

Inadequate focus on transport emissions

The progress reports of cities have minimal information on the indicators developed by CPCB for transport sector interventions requiring improvement in on-road emissions management, old vehicle phase out, vehicle electrification, public transport improvement, non-motorized transport and parking policy as a demand management measure. These strategies are not well developed quantitatively and qualitatively for implementation, funding and reporting.

For on-road emissions management, for instance, information is largely confined to the business-as-usual Pollution Under Control (PUC) challans and limited action on old vehicle phase out. But these have not translated into renewal and scrappage policies in line with the scrappage and fleet renewal notifications of MoRTH. Even where states have proposed advancement in on-road emissions monitoring with remote sensing monitoring of vehicles in their city action plans, this cannot proceed as the central rules have not been notified by MoRTH. There is also no strategy to phase out old heavy duty vehicles that are significant contributors among the vehicle segments.

Cities show some progress with respect to the implementation of the electric vehicle policy as it is backed by the central FAME incentives programme. But state-level support is still not robust enough. Only those cities—as in Maharashtra—where ULBs run city bus services, and Delhi with more targeted policy have taken the decision to leverage NCAP funding to expand their electric bus fleet. Some states are utilizing NCAP funds for expanding the charging infrastructure.

With respect to public transport, states have not yet adequately adopted state- and city level guidelines and service-level benchmarks for planning of public transport infrastructure and multi-modal integration to enable modal shift and increase ridership. The action remains extremely limited to only purchase of buses in some cases. There is no clarity about the improvement needed in the service level for planning and funding infrastructure for implementation. These indicators have not been aligned with the national urban transport policy and transit-oriented development policy to decide the full scope of interventions and tie funding accordingly.

Similarly, intermittent reporting on small corridors of walking and cycling in cities do not add up to any sizeable network to make a difference. Even though

substantial NCAP funds have gone towards road repair and road building, this has not led to adequate leveraging to build continuous network of walking and cycling infrastructure along with the carriageways as per the sustainable street design guidelines. Without a clear state or city-level mandate for such infrastructure development and adoption of street design guidelines for complete street management for all street users, ULBs which are responsible for this do not pay adequate attention to prioritize fund allocation for the implementation of street network development.

Moreover, the CPCB indicators related to parking policy as a demand management measure are not well understood. Cities often take this as a supply side management issue to plan for provisions of more parking to meet insatiable parking needs and report only on construction of multi-level car parks. Such actions are not aligned with the provision of the National Urban Transport Policy (NUTP) or National Transit Oriented Development (TOD) Policy, National Mission on Sustainable Habitat for transport and service level benchmarks of MoHUA. These policies have already underscored demand management and restraint principles. This means that while meeting the requirement of parking, area-wide planning must be undertaken to reduce demand for parking by limiting and demarcating legal parking areas, penalizing illegal parking, introducing dynamic variable parking rates, and eliminating free parking through parking area management plans (PAMPs). There is no clarity at the city level about why parking is a clean air action.

This requires CPCB to develop adequate guidance and align the transport indicators more explicitly with the relevant Central government policies that have defined the targets, and design principles of these measures.

Weaker focus on industry

Only if a non-attainment city is an industrial city/town, some additional steps on industrial pollution control get reported, but even this is not done uniformly and exhaustively. Industrial pollution control remains largely business-as-usual, with minimal reporting.

Pollution control in the industry sector is largely reported based on the regulatory function and requirements of stack emissions inspection, challans and closure notices, and notification of approved fuel list to promote cleaner industrial fuels. But this does not capture the status and scale of fuel change in industry, adoption of emissions control technology, and cleaner processes by types of industries on ground. Detailed status of large, medium and small-scale industries, and red and orange categories of industries is not usually available. There is little information

in city progress reports on the impact of the approved fuel list and any upscaled action to accelerate clean fuels and technology transition.

Even during the clean air plan preparation, the hard line drawn around the municipal boundary excluded industrial sources from the planning process in several cities. The plans have also not paid adequate attention to the small and medium-scale units that usually exist in non-conforming areas inside the cities. These are not accounted for as there is no legal recognition of these units.

Details also vary across industrial towns. For example, city reporting on the PRANA portal captures the detail on technology changes in the industries of Angul in Odisha. Such details may not be available for other cities on the portal.

Yet, comparatively more information may be available through other official forums and not necessarily through the PRANA portal. For example, clean fuel transition in Delhi-NCR; high adoption of Continuous Emissions Monitoring (CEM) in industries of Uttar Pradesh to assist in complying with emissions limit; enhanced capacity of CEMs in regional offices of Rajasthan; waste heat recovery in West Bengal that can reduce emissions from fuel savings; improvement in brick kiln technologies in some states; common boilers for small-scale units in Gujarat.

It may be noted that as a great part of investments in industrial pollution control is expected to be led by the private sector, it is necessary to capture how regulations, and enforcement are driving on-ground changes in industries in terms of technology and energy transformation while enabling upscaled investments to make an impact.

Fugitive emissions and industrial waste burning are often not part of the reporting.

Burning of solid fuels remains neglected

Increasingly, pollution source assessment has shown the impact of solid fuels for cooking in households and open eateries. This is a significant source of emissions and ambient concentration. In fact, this emerges as among the top polluters in the pollution inventory done for the seven states of the Indo-Gangetic Plain under the committee of the CPCB. Even though Central government programmes including Ujjwala scheme have increased use of liquified petroleum gas (LPG) nationally, a lot more is needed to make a difference. This will require focussed attention. There are examples like West Bengal taking steps to replace solid fuel stoves with LPG stoves in Kolkata and also distribute smokeless chulhas to control emissions. State-wise strategies are needed in this direction.

National policies need to get stronger to enable local action in cities and states

The multi-sector clean air action plan is both federal and national in nature. Several strategies related to industry, power plants, public transport infrastructure, waste management and clean fuels, need Central government support in terms of robust regulation, funding and pricing strategies.

Take for example the approved fuels lists that all state governments are issuing now. Often, they cannot scale up implementation as national policies on pricing and infrastructure for clean fuels are not adequately supportive. Natural gas needs to be under GST to avoid the cascading effect of state taxes to be affordable vis a vis more polluting fuels. Otherwise, the investments in the natural gas pipeline infrastructure will be more sub-optimal and inefficient.

Similarly, cities aiming to improve transit infrastructure and achieve multi-modal integration need Central government rules and support. Several cities including Mumbai, Delhi and non-attainment cities of Odisha and West Bengal require implementation of remote sensing measurements to advance on-road emissions monitoring and go beyond PUC. There is also a Supreme Court directive to MoRTH to expedite this. But these states cannot take this forward unless MoRTH notifies the rules under Central Motor Vehicle Act and Rules. Even though some cities like Kolkata and Delhi have initiated the pilots, its mainstreaming requires a Central government notification and certification system.

Interface with national policies and policy guidelines is thus needed to give direction to planning and designing of implementation strategies and drive technology and design changes at the city and regional level. This is needed for defining the scope of indicators for planning and to be in line with specific guidelines.

Need sustainable funding strategy both at the central and state levels for sustained and scalable action

The current funding system under the XV-FC grant will come to an end in 2025–26. It is not yet known to what extent the central allocation for the NCAP programme is scalable and how the proposed Champion Fund is expected to be designed and funded in the next phase.

There is a proposal to introduce a challenge fund that is likely to be earmarked for specified sectoral strategies. This needs to be designed well for scale of implementation across the states.

In the next phase, a more structured approach is needed to mobilize and align resources for clean air action. Year-wise budget forecasts for ongoing and new schemes at least up to 2030 need to be aligned. Schemes should also be aligned with the short and long-term targets and associated indicators of the action plan that are defined by the central and state level policies, regulations and service-level benchmarks. New schemes need to be defined for the full scope of scalable action.

The sectoral funding strategies need to converge more efficiently to accelerate sector-wise action on clean technologies, fuels, green infrastructure and urban design solutions. Even though national policies have suggested innovative financing strategies for sectoral resource mobilization, it is not usually practiced. Moreover, while the performance-linked grant is a good step forward, it is still very nascent and nebulous and needs more time to mature to be effective. It therefore becomes essential to argue that while national funding support needs to continue, the state governments must also adopt and implement innovative financing strategies for sectoral resource mobilization to sustain the action.

The review of the micro action plans from several cities shows that along with allocation of NCAP/XV-FC funds for different measures, at times some cities indicate state schemes that can also support implementation. But usually there is no state-level strategy to mobilize additional resources through innovative financing. The amount indicated is from the normal budgetary allocation.

State governments also need to do budget forecasting for advanced planning, build supportive strategies and repurpose funds according to clean air indicators to free up resources from ineffective strategies and infrastructure.

Yet another potential opportunity is the application of polluter pay principles for designing taxes, pricing policy and cess for additional revenue to create dedicated funds for targeted action. This has the potential to generate enormous additional revenue that can be leveraged to create dedicated funds for targeted action. Cess on polluting activities/products can create dedicated funds and change behaviour. There is considerable learning and experience in Delhi with respect to this.

In Delhi, an environment compensation charge is imposed on each truck entry daily, air ambience cess is imposed on per litre of diesel fuel sold, and one per cent of the price of the cars and SUVs with 2000 cc engines and above is collected at the time of the purchase. These measures have helped to create dedicated funds.

Currently, most state and city governments are underwriting the potential of generating revenue from parking by not enforcing variable parking pricing and eliminating free parking in all land-uses.

As the municipalities are the primary drivers of action, the opportunity of green municipal bonds can be explored. Already about 11 cities—Ahmedabad, Surat, Visakhapatnam, Amravati, Indore, Bhopal, Pune, Hyderabad, Lucknow and Vadodara—have raised Municipal Bonds. Ghaziabad, that was among the first to issue green municipal bonds, used the funds to recycle wastewater for drinking water.

As green transition for both clean air and climate change is gaining ground, green finance will become important to mainstream clean air action.

This also demands mainstreaming resources and repurposing of funds for clean air action. In some sectors, national policies have already provided for innovative financing policy**.** For instance, in the transport sector, TOD-linked financing including land value capture is in place. But these need to be institutionalized adequately at the state and city levels to be effective. Repurposing of funding will also be important to divert resources from inconsequential strategies to more effective strategies.

Convergence with central schemes needs to be much stronger and the central schemes also need to integrate the indicators that will help to deliver on clean air and low carbon objectives. Targeted subsidy programmes are needed to not only support scaling up of clean technologies, fuels and green infrastructure but also to address affordability and equity. In the industry sector, more robust market-based mechanisms also need to come into play. Thus, designing of fiscal strategy will require more innovative approaches.

Transparent details on the action taken as per the criteria of SVS can deepen understanding of solutions among cities

Currently, the annual ranking of cities based on their respective sectoral action and improvement in PM10 concentration is not publicly available with city-wise details. It is therefore not possible to ascertain the level, scale and quality of action in each sector or to understand the scale of action that has enabled the best performing cities to achieve 80–100 per cent of the quantitative targets set for each sector as per the criteria of Swacch Vayu Survekshan (SVS).

The reports that are available on the PRANA portal and its best practice portal are cursory, broad and in most cases without the requisite quantitative and qualitative detail on the scale and quality of the actions taken.

Usually, the information provided broadly touches upon policy notifications, tendering of projects, enforcement measures, construction of roads and facilities, etc. This does not include adequate quantitative and qualitative information related to the target to be achieved and the scale of implementation against that target. More detailed information can help all cities to understand the scale and quality of action needed and maturity and scale of implementation needed to improve the air quality.

Understanding the nature of action, emissions reduction and improvement in air quality can help to convey the scale and depth of action needed in different cities and beyond with different economic profiles and meteorological constraints.

Evidence of detailed action is sometime available outside the NCAP reporting system. The example is from the MoEFCC's Annual Report of 2023–24 that has provided the details for the interventions of the Air Commission in Delhi-NCR. This provides more quantitative information on the range of sector-wise measures implemented in Delhi-NCR. While this needs to be further improved to capture progress against targets and in terms of qualitative design of interventions, similar recording for other cities is needed under the NCAP and XV-FC grants.

The current level of action in Delhi-NCR, when combined with the series of actions that were implemented under the aegis of the Supreme Court in the preceding years, brings out the substantially diverse multi-sector action that has also bent the pollution curve in Delhi. Yet, the pollution level continues to remain daunting. It is this challenge that the NCAP programme needs to capture and convey. The level of action needs to be assessed against the level of challenges of mega cities and smaller cities and towns and the larger region. For instance, what does Delhi-NCR, with one of the highest concentrations of population and economic activities and constrained by an adverse meteorology, need to do to meet the clean air benchmark? How does funding support need to be customized accordingly? This will be different from the way smaller cities and towns will address action.

Tying up funding with sectoral targets and mandate makes implementation more effective

The NCAP has allowed reporting on the relevant sectoral action and funding to align with clean air action. Reviews of some of the city reports show that the ongoing

central or state schemes with stronger legislative and regulatory framework, time-bound mandate and committed funding have faster pace of progress.

For instance, the Central government scheme of Swachh Bharat Mission (SBM 2.0) and its performance-linked funding for garbage-free cities by 2025 has a mandate for remediation of legacy dumpsites, 100 per cent segregation, augmenting capacity for treatment-processing-recycle-recovery and diversion of maximum waste from the landfill by 2025. This has a massive funding allocation for the ULBs, accelerating action on municipal solid waste management, thereby contributing to the control of open burning and landfill fires. Similarly, its focus on C&D waste is helping to scale up infrastructure for C&D waste recycling.

Similarly, vehicle electrification programme under the central FAME-II has begun to phase in zero emissions vehicles that can have substantial impact on local air quality with scale.

The progress reports from cities have comparatively more information on these schemes and programmes.

The sectors that do not have specific Central or state government schemes with regulatory mandates and targets or committed funding with monitoring mechanisms, and rely more on business-as-usual strategies and incremental increase in state budget, show slower progress. These sectors do not have the requisite accelerators. This leads to asymmetry in action between sectors and within departments.

This is a lesson for other sectoral funding as well. Target and scope of sectoral action requires mainstreaming across departments and better detailing for upscaled implementation, and to drive technology and design changes. The objective of clean air action is to ensure accelerated clean energy transition across all sectors—industry, vehicles, households, mobility transition—to achieve clean and zero emissions from transport and circularity to recover resources from all waste streams to close the loop.

To be able to achieve this in a time-bound manner, the scope and design of the interventions in each sector require detailed indicators for proper designing of strategies and technology roadmap, and to tie funding with delivery of these objectives. Reviews of some of the city reports show that target setting for the sector is either missing or inadequate. The major thrust of the CPCB indicators for progress reporting is to help cities set annual and quarterly targets for each indicator and

set milestones for the sector. Nearly all cities have found it challenging to provide information on targets for future planning, action and funding. This is because adequate efforts have not been made at the state and department levels to identify the targets related to regulatory action, infrastructure development, compliance and enforcement framework, capacity building, and outreach strategies.

It has been observed that often the scope of several programmes/schemes and implementation strategies have not been adequately detailed out at the departmental level to be able to earmark budget for the new funding, repurposing of state budget and for reporting on all requisite indicators.

Go beyond cities to take a regional/airshed approach

The experience so far has shown that cities cannot meet their clean air benchmarks alone and need a regional approach to reduce the influence of transboundary pollution. For instance, the 2018 TERI-ARAI study has demonstrated how NCR contributes about 23–24 per cent to Delhi's PM2.5 concentration annually. This can be as high as 70 per cent in winter. Delhi also contributes 28 per cent of annual PM2.5 concentration in Noida that can increase to 40 per cent in winter.

This indicates that only local action will not help to meet the clean air targets in cities.

Technically, NCAP has taken this on board and has sought inter-state coordination. It has recommended comprehensive regional plan that needs to incorporate the inputs from the regional source apportionment studies. It has highlighted the measures that can be implemented across multiple jurisdictions.

The NCAP programme has further encouraged a focus on the Indo-Gangetic Plain for airshed approach. But the inter-state coordination framework is yet to develop. However, the State Action Plans must be leveraged to scale up priority strategies in targeted sectors and to minimize the influence of upwind pollution sources on downwind air quality within the state. In fact, following the directive of the NGT on 9 September 2021, detailed district-wise emission inventory of fine particles (PM2.5) over the IGP has been prepared. This will now require further deliberation with respect to interstate coordination—ideally through a state council—to account for the air quality impacts of upwind pollution sources on downwind air quality and its integration in the state action plans.

Within states, the state action plans need to address transboundary movement of pollution within cities and districts. The scope of the provisions of the Air

(Prevention and Control of Pollution) Act, 1981 that allows delineation of the "Air Pollution Control Area" and "critically polluted areas" can be further expanded to address shared responsibility.

At this stage the only workable model for such multi-jurisdiction action is in Delhi and NCR that includes four states. Over the last two decades, a series of directives have been issued for this region under the aegis of the Supreme Court and monitored by the Environment Protection (Prevention and Control) Authority (EPA) for the entire NCR.

Post 2019, the Commission on Air Quality Management (CAQM) has been set up for air quality management of this region. The Act under which the CAQM has been formed recognizes the transboundary nature of air pollution and gives cross-sectoral and cross-jurisdictional authority to the Commission. This integrated approach for harmonized action across jurisdictions is an important learning that needs to be integrated with the next phase of NCAP.

The state of Uttar Pradesh is beginning to take an airshed approach. This has highlighted the importance of such pollution sources as solid fuels for cooking, agriculture and heavy duty vehicles. These were not in the original focus for pollution control. This brings out the importance of combining city based action with the airshed based air quality management.[4]

Addressing implementation and compliance in small cities vs big cities

A regional approach is also an opportunity and a necessity to address pollution in smaller towns, and suburban and rural areas as these sub-regions do not have adequate resources and capacity like the big cities to implement complex measures and infrastructure. The emissions source inventory of the Indo Gangetic Plain states has shown that rural pollution sources can greatly influence the air quality of the region.

Smaller towns/suburban and rural areas require a cluster approach to roll out solutions collectively and have common infrastructure for asset sharing.

Technically, under the current funding strategy, the mega and big cities with more than million-plus population are getting addressed under the XV-FC grant and the smaller towns are being addressed by the NCAP funding from the MoEFCC. It is the smaller towns that are finding it tougher to utilize the funds and implement multi-sector action.

There will be a difference in scope of action, diversity and complexity of measures, depending on the size of the cities. The complex range of solutions including institutional arrangement, scale of infrastructure development, enforcement and compliance framework, resource requirements that have been planned for the mega and big cities are not always directly replicable in smaller cities.
With respect to smaller towns, it is clear that the planning will require local, cluster-based and asset sharing solutions. CSE's review of smaller ULBs across states has shown that the needs of smaller population and lower level of activities require different approaches.

For infrastructure development for waste management and recycling, public transport strategies, etc., smaller towns require a cluster-based approach. Instead of deploying capital intensive infrastructure per town, the deployment of infrastructure can happen for a cluster of towns. The same facility should be able to cater to the needs of several small towns efficiently.

However, such a focus can be challenging under the current NCAP structure for city action plans as this is focused on individual towns. Therefore, state clean air action plans will have to be leveraged to address the clustering of the needs of the smaller towns.

However, local enforcement related to waste burning, dust management and use of solid fuels can be common to all smaller towns and can be addressed locally.

Multiple agencies for common sectoral indicators need to align for action, reporting and enforcement

It is necessary to create combined mandate and databases when multiple agencies are involved in planning and execution of programmes in cities. Within the municipal limits, several departments can be involved with the provisioning of infrastructure like roads, electricity and electric vehicle charging infrastructure, bus transport infrastructure and buses, etc. or systems for enforcement.

For instance, it has been noted in several cities that there can be several road-owning agencies with disaggregated mandates and databases. Their roles and information systems need to be aligned for integrated tracking, monitoring and reporting. For instance, road infrastructure may be provided by several departments—PWD, municipalities and development authorities—within the same municipal jurisdiction but all of them need to be responsible for implementing common and upgraded road design guidelines for the carriageway, pedestrian and cycling infrastructure, greenery and innovative drainage, etc.

This is particularly relevant for enforcement strategies. Several CPCB indicators require data reporting on enforcement and penal action in different sectors. It is evident from ground level assessment that enforcement is often disconnected from the planning body or enforcement is shared between departments like the municipal corporations and traffic police depending on their jurisdictions or definition of their business rules. For example, in some cities, while municipalities and SPCBs enforce rules related to C&D inside the construction premises of the buildings, traffic police enforce rules outside the buildings in public areas. Therefore, responsibilities of the concerned departments must be established for each indicator for aligned action and reporting.

Similarly, ULBs or Transport Department might be responsible for planning some indicators and enforcing them to some extent, the Traffic Police may also have a role in enforcement of the same indicators. Therefore, all the departments will have to be adequately informed and aligned.

Need protocol for data recording and reporting on the indicators

CSE's review in cities shows the struggle that the ULBs and SPCBs face in collating information from all departments and then uploading the information on the PRANA portal. Sometimes it is evident that the concerned departments have requisite data/information on several indicators. But it is often not understood how to track and maintain the data set and use that for reporting purposes. Even though the departments have appointed nodal officials for reporting purposes, they do not have a protocol for departmental and inter-departmental flow of information.

As far as possible, the departments should be supported and enabled for automated digital system of e-recording of data based on well-defined protocol that is easily accessible according to pre-defined format of reporting. Capacity building is needed for this purpose. Sometimes, the departments may also have to generate information through surveys or ground-level assessment as part of the programme implementation. Departmental and inter-departmental flow of information (both quantitative and qualitative) for regular reporting will eventually require an automated dashboard at the city level. Several cities have started to report separately under NCAP and XV-FC funding and convergence funding.

Need stronger institutional mechanism and capacity for planning and implementation in cities

Several indicators have asked for strengthening of capacity of the departments for the purpose of monitoring, tracking and providing laboratory support for

air quality monitoring and assessment. Most cities have high level Task Force under the chairpersonship of the Chief Secretary of the state with representation of the heads of departments. This system has to work more effectively in planning the scope of multi-sector and multi-departmental action and for efficient fund allocation.

Each municipal corporation is also mandated to set up an Air Pollution Cell for programme monitoring and coordination. This needs representation from each sector with well-defined mandate and responsibility. This cell needs to be adequately empowered for inter-departmental coordination. This also requires supportive technical advisory for knowledge support for target setting and monitoring of action with requisite benchmarks in each sector. This requires detailed standard operating procedure (SOP) and management information system (MIS) within each department—preferably well automated, to ensure proper implementation and reporting.

There is also a strong need for training and skill development of public officials. It is important to create and design a module of training for more targeted orientation programmes to build capacity across all departments.

Adopt standardized protocol for air quality trend analysis to establish compliance under NCAP

As the NCAP system moves more towards performance-based monitoring and funding, it becomes necessary to standardize the protocol for the data analytics and statistical methods for estimating air quality changes especially based on real-time monitoring.

Currently, performance based on PM10 concentration is tracked based on annual changes. But this can be substantially impacted by the meteorology and weather conditions during the year.

This requires adoption of more robust statistical method and other criteria. There is no guidance yet on the number and type of monitoring stations to be considered for estimating city averages for long-term trend estimation. Similarly, the distribution of monitoring stations varies across cities, with some having 3–5 stations, while mega cities have anywhere between 15–40 stations. The key questions which arise are: Should all stations be taken for estimating city averages or selected monitors be used? Should the averages be based on one-year average or three-year rolling averages? How missing data and data substitution should be addressed? CPCB needs to answer these questions quickly.

It also appears that even though real-time continuous monitors are expanding in cities, real-time data is not considered for estimating long-term trends. Real-time data is considered only for daily AQI reporting. There is no established protocol yet for utilizing real-time data for long-term estimation though cities apply respective methods to do so. Even now cities are being asked to expand their manual monitors that have serious quality control and quality assurance challenges. This is largely because the focus continues to remain on PM10. But PM2.5 and all key gases will require real-time monitors. This needs to be addressed in the next phase.

It is also necessary to move towards assessment of impact of ongoing action on air quality to identify the gaps in action and scale and speed of implementation needed to make a difference.

Prioritize action in key sectors to implement at a scale across the regions

The Challenge fund that is under discussion needs to identify priority action across key sectors of pollution and develop a funding and compliance framework for their implementation in cities and at a regional scale. The next phase of funding has to ensure massive clean energy transition in industry; massive cleaning up of vehicle fleet by phasing out targeted end-of-life vehicles, especially heavy duty vehicles; electrification of vehicles at a scale for zero emissions transition; scale up integrated public transport; eliminate solid fuels for cooking; and achieve circularity by fully implementing the targets of 100 per cent collection and segregation of waste, material recovery, remediation of legacy waste in dumpsites and diversion of fresh waste from dumpsites.

In the next phase it is necessary to shift the focus towards implementation of priority action in key sectors of pollution at a scale and link the performance-linked funding with targeted milestones. The metrics of performance assessment should change accordingly. Only this can make a difference to air quality.

Performance-linked assessment needs to capture and promote best practices to build the learning curve for other cities

This review suggests that the system of ranking and scoring cities is an opportunity to capture the details of the sectoral good practices in different cities. If captured well, this can present a learning curve for others on the quality and scale of action and the direction of change needed to make a difference. As a policy it is necessary to take a best practice approach to designing implementation strategies in sectors to make change impactful. This cross-learning is crucial to empower change.

SECTION 1: Towards performance-linked funding for clean air action in cities

The National Clean Air Programme (NCAP) is the first ever time-bound, target-oriented clean air programme with performance-linked funding strategy for cities. It is an opportunity to make a difference, but to do so it needs to be driven by a well-designed implementation and compliance strategy. NCAP is an important step forward to create a nation-wide mandate for clean air action and targeted improvement in air quality to meet the National Ambient Air Quality Standards (NAAQS). The enabling mechanism that includes performance-linked funding, reporting and monitoring mechanism, along with ranking and benchmarking of cities, is in place. But more is needed to make the system robust by making the linkage between the clean air framework for action at the city, state and regional levels more aligned and targeted at the sectoral level. Sectoral action will have to be driven more cohesively and explicitly to meet the clean air targets. The next round of reforms will have to ensure this.

There are three different methods of funding for the NCAP programme. i) Fund allocated by the Ministry of Environment and Forests and Climate Change (MoEFCC) to 82 non-attainment cities; ii) Direct funding from the 15th Finance Commission (XV-FC) to the urban local bodies (ULBs) in 42 cities and seven urban agglomerations with more than a million population, and iii) Accounting of the convergence funding or the sectoral funding schemes that, if aligned, can provide clean air benefits.

FUNDING ALLOCATION AND UTILIZATION

As per the annual report of the MoEFCC for 2023–24, the Central government has allocated Rs 19,711.00 crore to 131 cities for the period of FY 2019–20 to 2025–26. Of this, about Rs 3,172.00 crore is allocated through the clean air programme scheme of the MoEFCC to 82 non-attainment cities and Rs 16,539.00 crore is allocated under the XV-FC to 42 million-plus cities/urban agglomerations under the Million-Plus Cities Challenge Fund.

An amount of Rs 1,436.25 crore has been released to 82 non-attainment cities under NCAP (hitherto NCAP cities) and Rs 8,357.63 crore to million-plus cities (hitherto XV-FC cities) till December 2023. An amount of Rs 3,131 crore has been allocated in the FY 2023–24 for 131 cities.[5]

According to the Press Information Bureau (PIB) release by MoEFCC in 2023, an amount of approximately Rs 9,650 crore has been released to the identified 131 cities from FY 2019–20 to FY 2023–24 (till 15 December) under the NCAP and XV-FC grant programmes.[6]

Even though cities have received a significant amount of funding for clean air initiatives, the level of utilization is not up to the mark and is significantly lower in NCAP cities than in XV-FC cities. Out of Rs 9,650 crore, an amount of Rs 1,292.50 crore was released to the NCAP cities, out of which about Rs 480.92 crores or 37.50 per cent was utilized till 15 December. On the other hand, Rs 8,357.51 crore was released to the XV-FC cities, out of which Rs 5,835.03 crore or 69.81 per cent was utilized till 15 December for improvement in air quality.

Clearly, utilization of the available funding falls short of the targets. However, as of 3 May 2024, a total of Rs 10,566.47 crore has been released to 131 NCAP and XV-FC cities. The overall utilization is Rs 6,806.15 crore, which is 64 per cent, till date. Out of which, an amount of Rs 831.42 crore (51 per cent) was utilized by the 82 non-attainment cities and Rs 5,974.73 crore or 67 per cent was utilized by 49 XV-FC cities.[7]

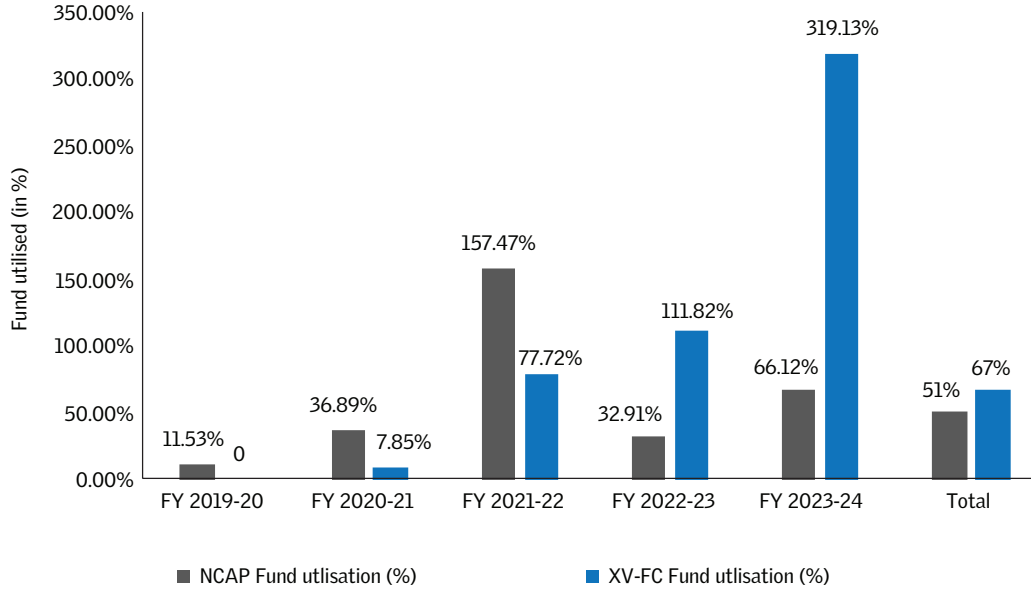
The most recent fund data reveals the utilization level and the fund release t rend year-on-year (see *Table 1: Release and utilization of funds under NCAP & XVFC, FY 2019–24* and *Graph 1: Utilization of funds under NCAP & XV-FC, 2019–20 to 2023–24*).

Table 1: Release and utilization of funds under NCAP & XV-FC, FY 2019–24 (as on 03.05.24)

Year	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24 (as on 03.05.24)	Total (in crore)
82 cities: Fund details under NCAP (in crore)						
Total fund released	224.92	150.52	96.62	476.27	667.14	**1,615.47**
Total fund utilized	25.94	55.53	152.15	156.77	441.15	**831.42**
Fund utilization (%)	11.53%	36.89%	157.47%	32.91%	66.12%	**51%**
49 cities: Fund details under XV-FC (in crore)						
Total fund released	-	4,400	2,025	1,932.63	593.5	**8,951 (as on 03.05.24)**
Total fund utilized	-	345.61	1,573.97	2,161.08	1894.07	**5,974.73**
Fund utilization (%)	-	7.85%	77.72%	111.82%	319.13%	**67%**

Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

Graph 1: Utilization of funds under NCAP & XV-FC, 2019–20 to 2023–24 (as on 03.05.24)



Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

STATE-WISE FUNDING STATUS AND UTILIZATION

For 24 states, information on financial progress and status of fund utilization is available under NCAP and XV-FC for the FY 2019–20 to 2023–24 (see *Table 2: Financial progress in states under NCAP and XV-FC funding)*. This is related to the allocation of Rs 1,615.47 crore to 23 states under NCAP from 2019–24 and a grant of Rs 8,951 crore to 15 states under the XV-FC programme from 2020–24 as on 03.05.24.

Under NCAP funding during 2019–24, out of the 23 states, Jharkhand, Gujarat and Chandigarh have utilized over 90 per cent of the funds, whereas Meghalaya, Assam, West Bengal, Jammu & Kashmir, Karnataka, Punjab and Delhi have utilized the least—below 40 per cent. Under the XV-FC grant, four states— Gujarat, Tamil Nadu, Rajasthan and Madhya Pradesh—show over 80 per cent utilization. Three states— Haryana, Andhra Pradesh, and Karnataka—show less than 40 per cent utilization (see *Table 2: Financial progress in states under NCAP and XV-FC funding* and *Graph 2: State-wise status of fund utilization (in %) under NCAP and XV-FC, FY 2019–20 to 2023–24).*

When combined spending is considered, the states that are at the lower end of the spending spectrum—below 60 per cent—are largely the states in the north or the Indo-Gangetic Plain that also face the most lethal pollution problem.

Table 2: Financial progress in states under NCAP and XV-FC funding

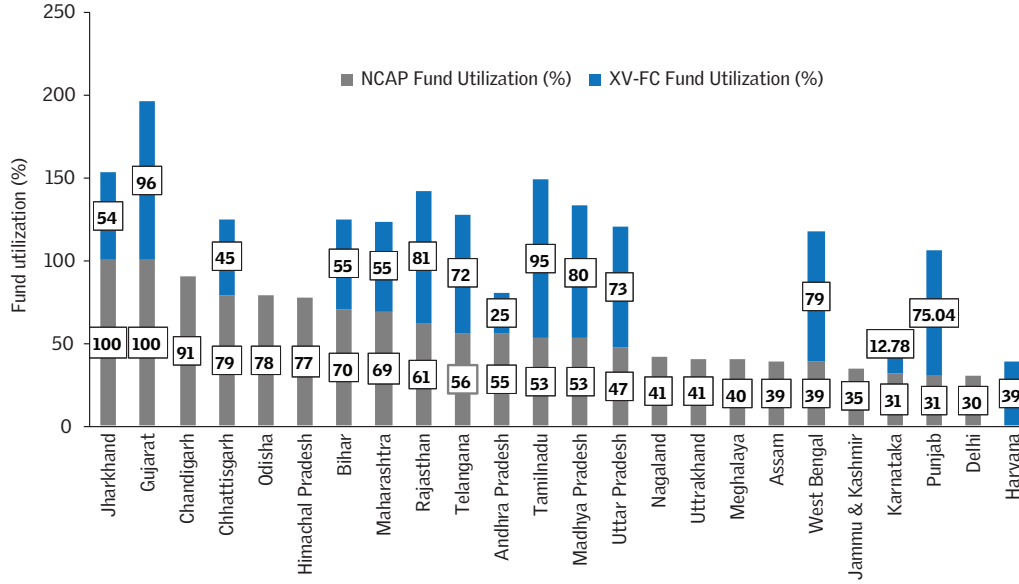
Sr. no.	State	NCAP, FY 2019-24 (as on 03.05.24)		
		Fund released (cr)	Fund utilized (cr)	Fund utilization (%)
1	Jharkhand	6	6	100
2	Gujarat	12	12	100
3	Chandigarh	32.81	29.73	90.61
4	Chhattisgarh	16.69	13.23	79.27
5	Odisha	74.61	58.2	78.01
6	Himachal Pradesh	17.5	13.54	77.36
7	Bihar	39.51	27.75	70.24
8	Maharashtra	199.06	137.03	68.84
9	Rajasthan	57.39	35.28	61.47
10	Telangana	20.04	11.19	55.84
11	Andhra Pradesh	107.49	59.45	55.31
12	Tamilnadu	13.4	7.15	53.36
13	Madhya Pradesh	63.28	33.22	52.5
14	Uttar Pradesh	397.14	187.65	47.25
15	Nagaland	20	8.16	40.8
16	Uttrakhand	68.27	27.72	40.6
17	Meghalaya	7.95	3.17	39.87
18	Assam	70.66	27.73	39.24
19	West Bengal	67.91	26.63	39.21
20	Jammu & Kashmir	115.95	40.38	34.83
21	Karnataka	62.42	19.59	31.38
22	Punjab	102.7	31.43	30.6
23	Delhi	42.69	12.6	29.52
	Total	1615.47	831.42	51%

Sr. no.	State	XV-FC, FY 2020-24 (as on 03.05.24)		
		Fund released (Cr)	Fund utilized (Cr)	Fund utilization (%)
1	Gujarat	796	760.66	95.56
2	Tamil Nadu	501.79	478.88	95.43
3	Rajasthan	514.94	416.17	80.82
4	Madhya Pradesh	570.49	457.66	80.22
5	West Bengal	907.85	713.98	78.64
6	Punjab	159	119.31	75.04
7	Uttar Pradesh	1605.75	1171.44	72.95
8	Telangana	540.25	389.66	72.13
9	Bihar	288.6	158.27	54.84
10	Maharashtra	1555.34	850.95	54.71
11	Jharkhand	273.44	146.46	53.56
12	Chhattisgarh	231.7	104.63	45.16
13	Haryana	73.53	28.6	38.89
14	Andhra Pradesh	253.6	62.43	24.62
15	Karnataka	535.1	68.37	12.78
	Total	8951	5974.73	67%

Index	
Per cent of fund utilized	
Above 80%	
>60-80%	
>40-60%	
Below 40%	

Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

Graph 2: State-wise status of fund utilization (in %) under NCAP and XV-FC, FY 2019–20 to 2023–24

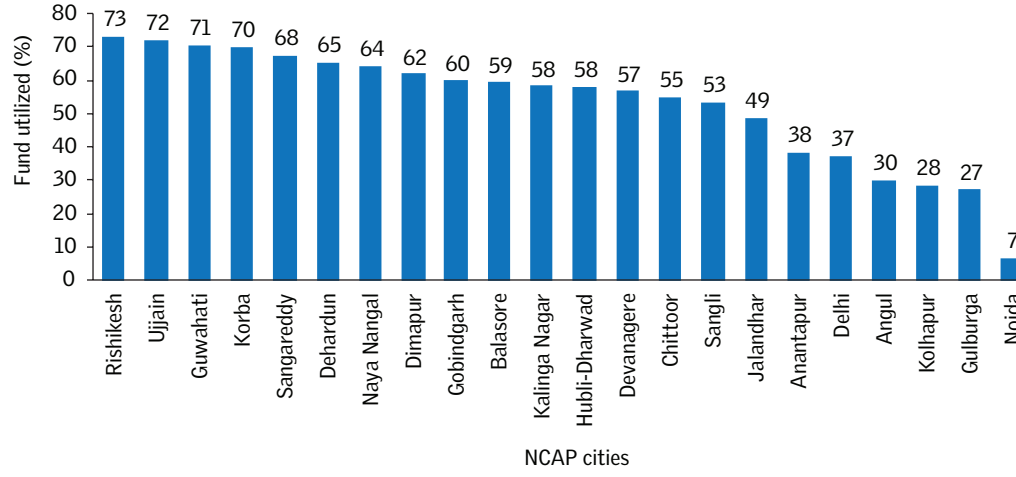


Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

CITY-WISE FUNDING STATUS AND UTILIZATION

City-wise detailed information on the financial status and utilization of funds for 47 cities is also provided under NCAP and XV-FC for the FY 2019-20 to 2023–24 (till date, as on 3 May 2024). This is linked to the funds released to 82 cities under NCAP from 2019–24 and to 49 cities under the XV-FC programme from 2020–24 totaling Rs 6,806.15 crore.

Graph 3: City-wise status of fund utilization for selected cities under NCAP, FY 2019–20 to 2023–24 (in %)

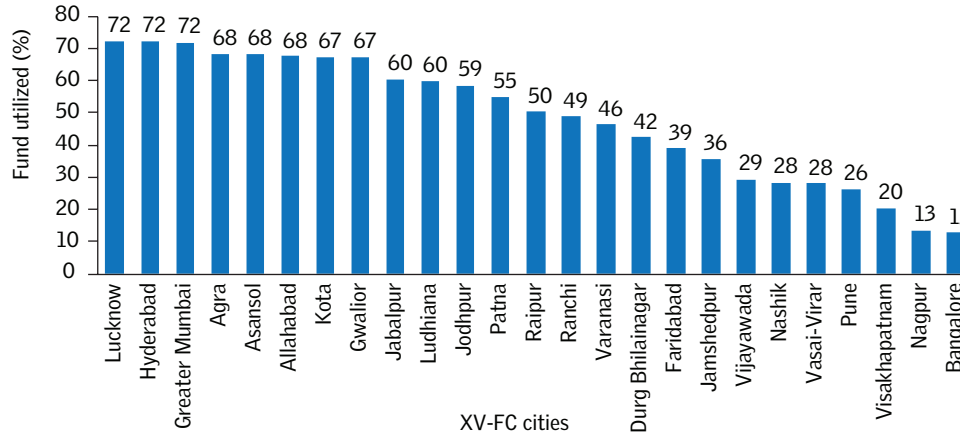


Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

Based on the information available under NCAP funding during FY 2019-24, Rishikesh, Ujjain, Guwahati and Korba have utilized over 70 per cent of the funds, whereas Anantapur, Delhi, Angul, Kolhapur, Gulbarga and Noida have utilized the least—below 40 per cent (till 3 May 2024) (see *Graph 3: City-wise status of fund utilization (in %) under NCAP, FY 2019–20 to 2023–24).*

Under XV-FC grant during FY 2020-24, Lucknow, Hyderabad and Greater Mumbai show over 70 per cent utilization. Nine cities—Faridabad, Jamshedpur, Vijayawada, Nashik, Vasai Virar, Pune, Visakhapatnam, Nagpur and Bangalore—show less than 40 per cent utilization (till 3 May 2024) (see *Graph 4: City-wise status of fund utilization (in %) under XV-FC, FY 2020–21 to 2023–24).*

Graph 4: City-wise status of fund utilization (in %) under XV-FC, FY 2020–21 to 2023–24



Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024

OVERALL PROGRESS UNDER NCAP FUNDING AND XV-FC GRANT

Specific milestones were identified under the NCAP programme to enable cities to prepare and implement their clean air action plans. These include preparation of city action plans, completion of source apportionment studies, hotspot identification, pollution emergency response plan, alignment with Nagar Van Yojana, Mission LiFE indicators, setting up of state-level air quality management committee, and subsequently ranking based on SVS.

The available status shows that 131 non-attainment cities have prepared city action plans that have also been approved by the CPCB for implementation. Only 49 cities have completed the source apportionment studies so far. The original deadline for

completion of these studies was 2020. About 120 cities have identified hotspots (see *Table 3: Physical progress under NCAP/XV-FC, 2023–24)*. This indicates that quite a large number of cities do not have information on the relative contribution of different pollution sources to inform their planning and implementation process and need to take a best practice approach.

Table 3: Physical progress under NCAP/XV-FC, 2023–24

Actions	Status of completion
National Action Plans	8 Ministries
City Action Plans	131 cities
State Action Plans	24 states
Annual Action Plans	128 cities, 3 awaited
Source Apportionment Studies	49 cities completed, 82 under progress
Hotspot identification	120 cities, 11 under process
Hotspot Action Plans	106 cities, 25 under process
Emergency Response Plans	131 cities
Inclusion of ATS in Action Plan	91 cities
Inclusion of RVSF in Action plan	33 cities
Nagar Van Yojana proposals	64 cities
Mission Life Indicators for FY 23-24	124 cities, 7 awaited
Swachh Vayu Survekshan 2023	131 cities
State Level Air Quality Management Committee (AQMC)/ State Level Monitoring Implementation Committee (SLMIC), FY 2023–24	Conducted in 22 states, not conducted in 2 states
DLMIC Meetings, FY 2023–34	Conducted in 112 cities, not conducted in 19 cities

Source: Created by CSE, data compiled from various sources.

CONVERGENCE FUNDING

The monitoring and reporting mechanism of the NCAP programme allows cities to account for progress under different sectoral funding schemes of the central and state governments that have bearing on air quality. These include a wide range of funding schemes related to waste management, urban renewal, transport and electric mobility.

This encompasses central schemes such as Swachh Bharat Mission (SBM 2.0) - Urban, AMRUT, Smart City Mission for Urban Renewal, SATAT, FAME-II for electric vehicles, among others. To this are added the resources from state and UT agencies, such as municipal corporations, urban development authorities and industrial development authorities.

It is estimated that a total of Rs 4,54,230 crore has been allocated through convergence by partner ministries.[8] This is a combined funding from a diverse set of ministries of the Central government for different schemes (see *Table 4: Convergence of Central schemes for funding of clean air action in NCAP cities).* Several of these schemes such as SBM 2.0 for waste management have also set sectoral targets and mandates that further reinforce action in cities.

Against this broad framework of funding strategy, it is necessary to understand the performance-linked funding and how this has influenced clean air action in cities.

Table 4: Convergence of Central schemes for funding clean air action in NCAP cities

Central schemes	Sector	Status of implementation in 131 NCAP cities	Funds allocated (as on 30 January 2024)	Timeline	Responsible agency
SBM 2.0	Waste management	1. Setting up of solid waste management processing facilities • Out of 131 cities, action plans of 105 cities approved for setting up of 100% waste processing facilities (Coverage in NCAP cities: 105/131) 2. Remediation of all legacy waste dumpsites in all cities • Action plans of 76 cities approved to remediate 978 MT of legacy waste, 38 cities reported no requirement (Coverage in NCAP cities: 114/131)	Rs 3,73,127 crore (SBM 2.0 + Smart City Mission + AMRUT)	FY 2021–26	MoHUA
		3. Procurement of mechanical road sweepers in 131 NCAP cities and 21 cities with more than 5-lakh population • Action plans of 82 cities approved to procure 472 sweepers (Coverage in NCAP cities: 112/131) 4. C&D waste management in 131 NCAP cities & 21 cities with more than 5-lakh population • Action plans of 52 cities approved to setup 6,228 TPD capacity and 47 cities reported with setting up of small depots (Coverage in NCAP cities: 99/131)			

Central schemes	Sector	Status of implementation in 131 NCAP cities	Funds allocated (as on 30 January 2024)	Timeline	Responsible agency
Smart City Mission	Urban transport	Out of 131 NCAP cities, 47 smart cities have created the Integrate Command Control Centres (ICCC) and 17 of these ICCCs are linked to environmental and air quality sensors. (Coverage in NCAP cities: 47/131) There are 21 NCAP cities that have an 845-km operating metro network, and about 908 km are under construction. Government of India launched "PM-eBus Sewa Scheme" on 16 August 2023 with the aim to augment bus operations by deployment of 10,000 electric buses on PPP model. Of the 131 NCAP cities, 83 cities are eligible for this programme.		FY 2015–16 to FY 2019–2020, extended till 2024	MoHUA
AMRUT	Water supply, sewerage connection, green spaces, parks and NMT	Out of 131 NCAP cities, 106 cities have committed to 728 parks and green space projects of Rs 616.38 crore. For NMT, 16 cities have taken up 74 projects worth Rs 483.71 crore. Action plans for green space creation and water body regeneration have been submitted. (Coverage in NCAP cities—AMRUT 1.0: 106/131 & AMRUT 2.0: 131/131cities		FY 2021–22 to 2025–26)	MoHUA
Vehicle Scrapping Policy	Vehicle Scrapping and phase-out of old vehicles	Infrastructure development: 91 cities have approved the inclusion of ATS in action plans, while 33 cities have authorized the inclusion of RVSF in action plans (as on January 2024). Scrapping of vehicles: 8,800+ vehicles scrapped till date (Private vehicles: 5,800+ and Government vehicles: 3,074) 3,900+ additional government-owned vehicles in the process of auction for scrapping.	Rs 10,000 crore	Started in 2021	MoRTH

Central schemes	Sector	Status of implementation in 131 NCAP cities	Funds allocated (as on 30 January 2024)	Timeline	Responsible agency
Sustainable Alternative Towards Affordable Transportation (SATAT), City Gas Distribution Network, PMUY, GOBARdhan	Use of natural gas in industry, vehicles and as a cooking fuel and set up 5,000 Compressed Bio-Gas (CBG) production plants	Petroleum and Natural Gas Regulatory Board (PNGRB) has approved the establishment of CGD networks in 127 out of 131 cities. Out of the 127 cities authorized, CGD activities commenced in 10 cities. Of the 131 NCAP cities, 80.35 lakh PNG connections, 2,578 CNG stations and 21 CBG plants are operational in 14 cities, while the remaining 29 are planned for 15 cities. The target of supplying 8 crore LPG connections has been accomplished. One crore more LPG connections will be made available under PMUY in order to expand LPG coverage (as on 04.05.2023).	Rs 9,670 crore	October 2018 to 2023–24	MoPNG
FAME II	To promote electric vehicle and affordable & environment friendly public transportation	914,524 consumer electric vehicles were sold in India under the FAME II program as of 02.03.2023. Up till March 2023, a total of 3,738 e-buses have been approved under FAME II, and 2,435 of those have been delivered to different states. Therefore, a total of (3,738+3,472) 7,210 e-buses will eventually be deployed in several states under the FAME II initiative. Achievements of FAME II (as on 02.03.2023): • Total no. of vehicles supported: 936,801 • Fuel saved: 260,845,657 litres • CO_2 reduction: 377,517,832 kg • Public and shared transportation for higher capacity utilization	Rs 55,938 Cr	Extended up to July 2024	Ministry of Heavy Industries (MHI)
National Mission on Biomass	Conversion of biomass to power in an eco-friendly manner to reduce the carbon footprint of thermal power plants	MoEFCC has mandated the use of minimum 5% of biomass in thermal power plants located in NCR and adjoining areas. 97,635 MT of biomass has been used by 41 units with capacity of 55,590 MW. Procurement of 1,192.64 lakh MT of biomass has been initiated and is at various stages of procurement process in several TPPs.	Rs 1,300 Cr	FY 2021–22 up to FY 2025-26	MoP

Central schemes	Sector	Status of implementation in 131 NCAP cities	Funds allocated (as on 30 January 2024)	Timeline	Responsible agency
Installing flue-gas desulphurization and pollution control measures	To install FGD in thermal power plant to reduce emissions	The implementation of pollution control equipment and FGD in 75 thermal power plants (23,489 MW) in 13 NCAP cities to meet new emission norms. So far, 7 units with capacity of 2,080 MW have installed FGD and remaining are at various stages.		Extended up to 2027	MoP
Nagar Van Yojana	To increase the green cover by creating Nagar Van and Nagar Vatika	64 NCAP cities have submitted the proposals under Nagar Van Yojana and 335 Nagar Van/Vatika projects have been approved till date.	Rs 895 Cr	2020–26	MoEFCC
National Bio Energy Programme	Waste to energy programme and biogas programme	Setting up bioenergy projects such as biogas, bio-CNG, power from urban and rural areas in NCAP cities	Rs 858 Cr	FY 2021–22 to 2025–26	MNRE
		Total allocated fund	**Rs 4,54,230 crore**		

Source: Compiled by CSE. Data based on:
1. PRANA Portal: Minutes of 2nd meeting of National Apex Committee under NCAP, MoEFCC, 11 April 2023
2. PRANA Portal: Minutes of 3rd meeting of National Apex Committee under NCAP, MoEFCC, 8 February 2024

SECTION 2: Evolving metrics for performance-linked funding

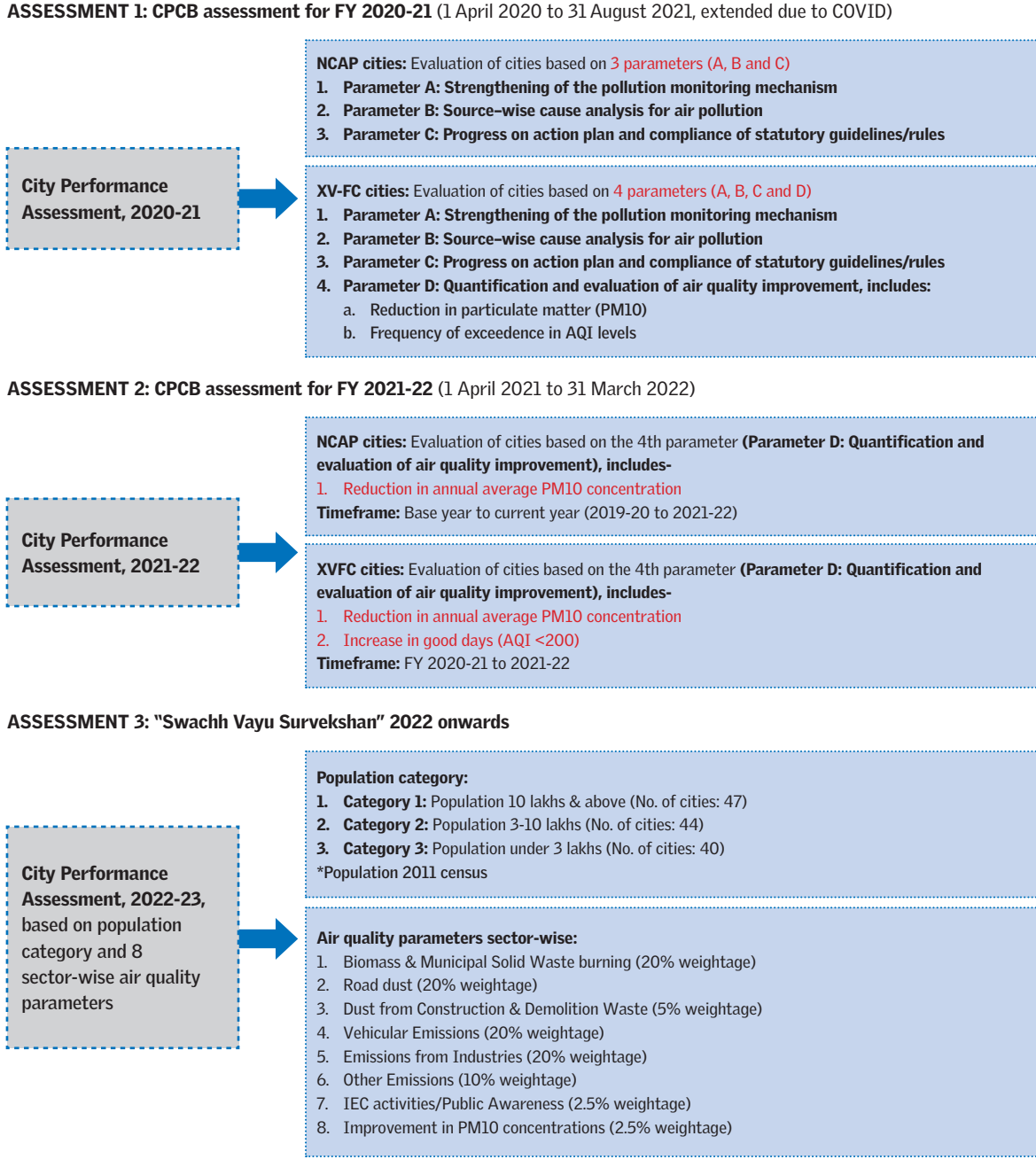
Since the inception of the programme, the metrics and methods adopted for the assessment of the clean air performance of cities have changed and evolved continuously across all the three subsets of the programme: i) Cities that qualify only for the NCAP funding from the MoEFCC, ii) Cities that qualify only for XV-FC grant, and iii) SVS ranking introduced in 2022 that applies to all cities.

It is therefore important to understand both the common grounds as well as the variable factors in the evolving metrics.

SCORING AND RANKING BASED ON PERFORMANCE OF THE NCAP CITIES AND XV-FC CITIES

The method of assessment adopted for the 82 NCAP cities and for the 42 XV-FC cities are different and have evolved differently over time (see *Figure 1: Evolving methods of performance assessment for NCAP and XV-FC cities from 2020–21 to 2022–23*). The detailed method of performance assessment, scoring and ranking of cities that have evolved over the years for the NCAP cities and XV-FC cities are outlined in Annexure 1.

Figure 1: Evolving methods of performance assessments for NCAP and XV-FC cities from 2020–21 to 2022–23



Source:
Assessment 1: 5th meeting of steering committee of National Clean Air Programme (NCAP), 5 August 2022
Assessment 2: 2nd Meeting of Apex Committee National Clean Air Programme (NCAP), MoEFCC, 15 March, 2023
Assessment 3: Swachh Vayu Survekshan report, 2023

Assessment 1, 2020–21

Metrics for 82 NCAP cities: In FY 2020–21, evaluation of city performance was based on three parameters: Strengthening of the pollution monitoring mechanism, source-wise cause analysis for air pollution, and progress on action plan and compliance of statutory guidelines/rules (*see Annexure 2)*.

The scoring of cities considered the FY 2019–20. In the first assessment, 40 per cent weightage was given to the preparation of clean air action plans and 60 per cent to the three parameters (strengthening of the pollution monitoring mechanism, source-wise cause analysis for air pollution, and progress on action plan and compliance with statutory guidelines). The PM10 and AQI data was not considered during the first year of assessment (see *Table 5: Criteria for assigning score to NCAP cities*).

Table 5: Criteria for assigning score to NCAP cities

Activities	Score
Preparation of City Micro Action Plan as per CPCB specified modal format	40
Performance assessment based on parameters A, B and C 1. Strengthening of the pollution monitoring mechanism: 20 marks 2. Source-wise cause analysis for air pollution: 20 marks 3. Progress on action plan and compliance of statutory guidelines/rules: 20 marks	60
Total	100

Source: Amendments in guidelines for release and utilization of funds under NCAP, MoEFCC, 25 August 2022

Metrics for 42 XV-FC cities: During the first assessment year of FY 2020–21, the performance of 42 XV-FC cities was evaluated using four parameters: Strengthening of the pollution monitoring mechanism, source-wise cause analysis for air pollution, progress on the action plan and compliance of statutory guidelines/rules, and quantification and evaluation of air quality improvement.[9] The additional parameter was the trend in PM10 concentration (*see Annexure 2*).

The assessment has been done for the FY 2019–20 to 2020–21. The scores were attributed by allocating 30 per cent of the total weight to three parameters (strengthening of the pollution monitoring mechanism, source-wise cause analysis for air pollution, progress on the action plan and compliance of statutory guidelines/rules) and 70 per cent to the quantification of improvements in air quality. The reduction in PM10 concentration from the previous year to the current year and the increase in good days (AQI) were considered to assess the cities (see *Table 6: Criteria for assigning scores to XV-FC cities)*.

Table 6: Criteria for assigning scores to XV-FC cities

Activities	Score
Parameter A: Strengthening of the pollution monitoring mechanism	10
Parameter B: Source-wise cause analysis for air pollution	10
Parameter C: Progress on action plan and compliance of statutory guidelines/rules	10
Parameter D: Quantification and evaluation of air quality improvement	70
Total	**100**

Source: Operational guidelines for implementation of the recommendation on ULB grants, XV-FC, 10 August 2021

The evaluation could not be comprehensive in the first year. As per the minutes of the third meeting of the steering committee of the National Clean Air Programme, September 2021, 125 cities had got their city action plans approved and only 58 cities had submitted their micro action plans. Only 12 cities had completed source apportionment studies, 72 cities were in progress and 42 were still in tendering stage. Several cities were still in the stage of evaluation and seeking approval. There was delay in fund disbursement due to COVID-19.

CPCB was able to prescribe the format to cities for preparation of micro action plans only in April 2021. This was insufficient time to record the sector-wise actions and their implementation. The cities could not make timely submissions.

There was uncertainty over the city evaluation method. All 131 cities were not on the same page as more than half of them had not yet prepared their annual action plans and source apportionment studies. They had not uploaded information on the PRANA dashboard.

Assessment 2, 2021–22

Metrics for 82 NCAP cities: During 2021–22, the cities were evaluated based on only one parameter: 'Quantification of improvement in air quality'. Assessment was done based on comparison of the base year and the current year (2019–20 and 2021–22). Data from the base year FY 2019–20 and FY 2021–22 for annual average PM10 concentrations was compared and integrated with the daily mean data from stations that include manual and continuous monitoring.

The scoring of NCAP cities uses a performance factor. The performance factor is computed to compare the actual reduction in PM10 concentration with the targeted reduction during the assessment year. Cities that achieve higher PM10

reductions against the targets get a score above 100. Cities that show reduction in PM10 of 40 per cent or more are classified as the best performers. Those with less than 40 per cent improvements are classified as the least performers.

If cities get higher PM10 reduction against the given target, they score above 100 and are eligible for the full amount under performance-based incentives. If the PM10 reduction is as per the target, they score 100 and they are eligible for allocation. If there is no reduction against the given target or there is negative reduction the score is zero and cities lose funding[10] (see *Table 7: Performance factor method to evaluate NCAP cities).*

The performance factor for cities is calculated to compare the actual reduction in PM10 concentration against the targeted reduction during the assessment year. For instance, in 2019–20, the PM10 level in Nellore city was 67μg/m^3 which reduced to 55 μg/m^3 in 2021–22. Thus, it was reduced by 12 μg/m^3 against the city target of 3 μg/m^3. Therefore, the performance factor of the city was (100x12/3) 400 (*see Annexure 3 and Annexure 4*).

Table 7: Performance factor method to evaluate NCAP cities

Performance factors of 82 NCAP cities		
Scoring basis	**Score assigned to city**	**Fund allocation**
Higher PM10 reductions against the given target	Above 100	Eligible for performance-based incentives
PM10 reduction against the given target	100	Eligible for performance-based allocation
No reduction in PM10 or negative reduction	0	No grant

Source: Amendments in guidelines for release and utilization of funds under NCAP, MoEFCC, 25 August 2022

As per the assessment of 2022–23, 18 cities scored more than 100 and were among the best performing cities. These included Srinagar, Gorakhpur, Durgapur, Moradabad, Firozabad, Bareilly, Raebareli, Thoothukuddi, Haldia, Silchar, Nalgonda, etc. About 53 cities scored below 40 and were among the least performing cities. These included Delhi, Chandigarh, Jammu, Noida, etc. (see *Table 8: Scoring of NCAP cities, 2022–23*).

Table 8: Scoring of NCAP cities, 2022–23

Performance score	No. of cities	Cities
>100	18	Srinagar, Gorakhpur, Durgapur, Moradabad, Bareily, Firozabad, Gulbarga, Raebareli, Nalagarh, Thoothukuddi, Haldia, Silchar, Nalgonda, Kalinga Nagar, Brynihat, Dera Baba Nanak, Kohlapur, Raebareli
>80-100	7	Nalbari, Jalandhar, Parwanoo, Sibsagar, Latur, Khanna, Dehradun
>60-80	2	Ujjain, Patiala
>50-60	1	Naya Nangal
>40-50	1	Rajahmundry
Below 40	53	Delhi, Chandigarh, Jhansi, Jammu, Noida, Hubli Dharwad, Sangli, Guwahati, Rourkela, Cuttack, Bhubneshwar, Guntur, Balasore, Kashipur, Udaipur, Nagaon, Jalgaon, Davanagere, Dewas, Dimapur, Ongole, Kurnool, Korba, Kadapa, Vizianagaram, Gaya, Eluru, Srikakulam, Gajraula, Angul, Baddi, Anpara, Gobindgarh, Dera Bassi, Sangareddy, Paonta Sahib, Jalna,, Chandrapur, Akola, Damtal, Kala Amb, Muzaffarpur, Rishikesh, Kolhapur, Nellore, Amravati, Khurja, Sagar, Sunder Nagar, Talcher, Kohima, Solapur
Total	82	

Source: PRANA Portal- Minutes of 13th meeting of implementation Committee on NCAP, 26 June 2023

Performance-based incentives for 82 NCAP cities, 2021 onwards: Cities with scores higher than 100 have been considered for incentive grants from undistributed grants. The leftover funds are distributed to cities which score above 100 in proportion to their score above 100 multiplied by their percentage allocation (fund allocation ratio). The additional allocation will not be more than their annual allocation.[11]

In 2023–24, about 27 NCAP cities received incentive grants based on their performance in FY 2022–23. These cities were Ongole, Nellore, Nalagarh, Sunder Nagar, Srinagar, Gulburga, Sagar, Latur, Kolhapur, Amravati, Byrnihat, Kohima, Talcher, Kalinga Nagar, Naya Nangal, Pathankot/DeraBaba, Tuticorin, Nalgonda, Raebareli, Khurja, Firozabad, Bareily, Gorakhpur, Muradabad, Dehradun, Haldia and Durgapur.

Metrics for 42 XV-FC cities: The performances of 42 XV-FC cities were evaluated using two parameters—reduction in particulate matter and increase in good days as per AQI (*see Annexure 5*). Average PM10 concentration and AQI days for FY 2021–22 were compared with data from the previous year, i.e., FY 2020–21. For this purpose, daily average data of manual as well as continuous monitoring stations were considered. The average annual PM10 concentration was calculated after removing 2 per cent outliers for both years for comparison of values.[12]

The scoring of 42 XV-FC cities has been done as per the performance factor. The performance factor was computed based on the reduction in annual average PM10 concentration (R250 μg/m^3) and increase in good days (AQI<200). The cities that demonstrate higher reductions in PM10 concentration (15 per cent and above) and greater improvement in good days (15 per cent and above) obtain scores of 100. The cities that demonstrate lower improvement in PM10 concentration and good days get scores of 25.

For first and second instalments, Utilization Certificates of minimum 60 per cent of the total funds released in the preceding year (2020–21) were required. In the second instalment, this changed to 40 per cent of the annual allocation of the city to be determined on the basis of the score assigned to the city based on the performance (see *Table 9: Performance factor method to evaluate XV-FC cities).*

Table 9: Performance factor method to evaluate XV-FC cities

Sr. no.	Reduction (%) in annual average PM10 concentration	Increase in good days (%)	Performance Factor, SD = Score, S*	Per cent of fund based on performance score
1	High	High	100	100
2	Low	High	75	75
3	High	Low	50	50
4	Low	Low	25	0

Source: PRANA Portal- Minutes of 5th meeting of Steering Committee of National Clean Air Programme (NCAP), MoEFCC, 29 July 2022

For 42 XV-FC cities, the city-wise distribution of grants for the period 2021–26 is based on the population. The grant for year 2022–23 was released based on the performance assessment of the year 2021–22.[13]

During the first assessment of XV-FC cities in 2021–22, Varanasi, Lucknow and Allahabad were among the best-performing cities that obtained scores of 100; Ghaziabad, Kanpur, Patna, Jodhpur, Faridabad and Dhanbad were among the least performing cities to obtain scores of 25, while the remaining 33 cities have a score of 75 (see *Graph 5: Scoring and performance assessment of XV-FC cities, 2021–22).*

As per the XV-FC cities assessment in 2022–23, Ahmedabad, Rajkot, Dhanbad and Varanasi were the best-performing cities that obtained scores of 100. On the other hand, Patna, Faridabad, Gwalior, Vasai-Virar, Ludhiana, Jodhpur, Ghaziabad, Lucknow, Meerut and Asansol scored 25 and were the least performing cities.

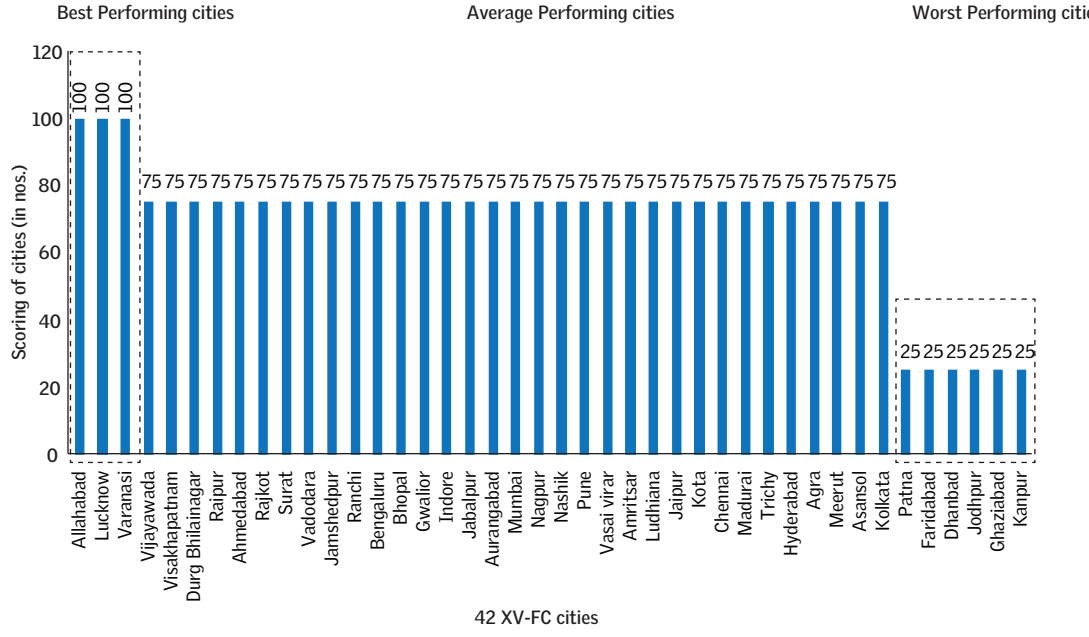
The remaining 26 cities scored 75 and two cities scored 50. (see *Table 10: Scoring of XV-FC cities, 2022–23* and *Graph 6: Scoring and performance assessment of XV-FC cities, 2022–23*).

Table 10: Scoring of XV-FC cities, 2022–23

Performance Score	No. of cities	Cities
100	4	Ahmedabad, Rajkot, Varanasi and Dhanbad
50	2	Agra and Kanpur
75	26	Chennai, Trichy, Raipur, Nashik, Vijayawada, Madurai, Bengaluru, Durg Bhilainagar, Aurangabad, Nagpur, Pune, Hyderabad, Indore, Visakhapatnam, Kolkata, Jabalpur, Kota, Amritsar, Mumbai, Vadodara, Surat, Ranchi, Jaipur, Jamshedpur, Bhopal
25	10	Asansol, Gwalior, Faridabad, Lucknow, Meerut, Ghaziabad, Kanpur, Jodhpur, Patna and Vasai-Virar
Total	42	

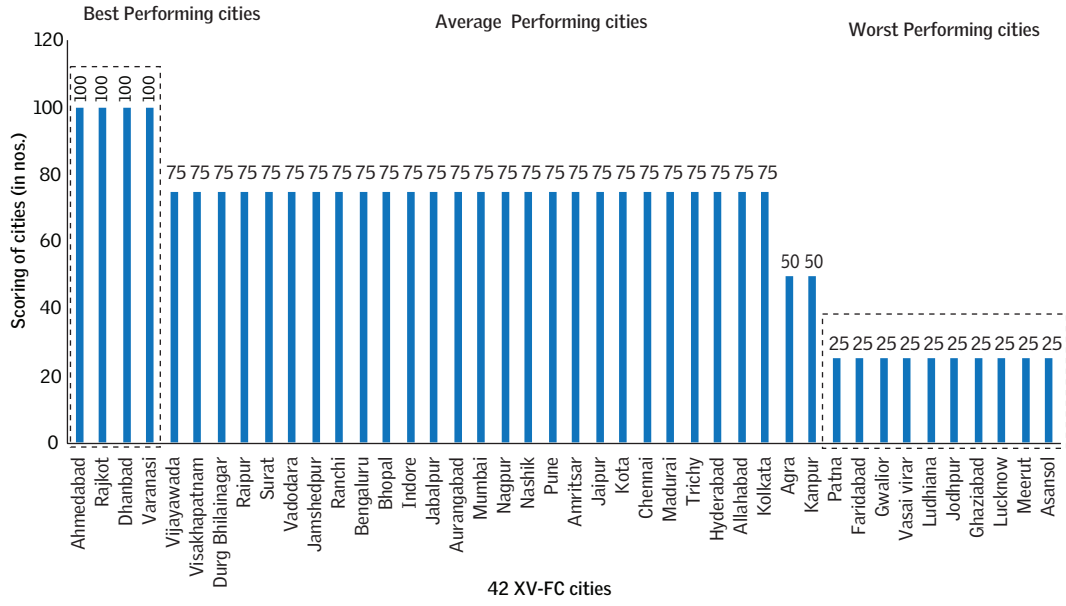
Source: PRANA Portal- Minutes of 13th meeting of implementation Committee on NCAP, 26 June 2023

Graph 5: Scoring and performance assessment of XV-FC cities, 2021–22



Source: PRANA Portal- 5th meeting of steering committee of National Clean Air Programme (NCAP), 5th August 2022

Graph 6: Scoring and performance assessment of XV-FC cities, 2022–23



Source: PRANA Portal- Minutes of thirteenth meeting of implementation committee for NCAP, CPCB, 26 June 2023

SWACHH VAYU SURVEKSHAN, 2022: DIFFERENT METRICS TO EVALUATE CITIES BASED ON POLICY MEASURES

In 2022, there was a strategic shift to add another layer of assessment based on the level of multi-sectoral action implemented in cities to reduce emissions. Swachh Vayu Survekshan was introduced by the MoEFCC to rank cities based on both air quality improvement and the level of action implemented and to give cash prize to the winning cities. Two assessments have been carried out so far as per the "Swachh Vayu Survekshan 2022–23" requirements.

Assessment 3: Swachh Vayu Survekshan, 2022 onwards

The 131 NCAP cities were ranked in SVS based on population and implementation of activities approved under city action plan and air quality in 131 NCAP cities.[14] For this purpose cities are divided into three categories—Category 1: Cities with more than 10 lakh population; Category 2: With population between 3 lakh to 10 lakh; Category 3: With population below 3 lakh (see *Table 11: Ranking of cities based on population categorization).*

This ranking considers eight sectors for implementation of action as per the action plan that include biomass and municipal solid waste, road dust, dust from construction and demolition, emissions from vehicles and industries, other emissions, public awareness activities, and improvement in PM10 concentration.

Table 11: Ranking of cities based on population categorization

Category	No. of cities	Population
Category 1	47 cities	Above 10 lakh plus population (5 NCAP funded cities are also Million Plus cities (MPCs) apart from 42 MPCs under XV-FC)
Category 2	44 cities	Above 3 to 10 lakh population
Category 3	40 cities	Under 3 lakh population

*Population 2011 Census

Source: Revised Guidelines for Ranking of Cities under NCAP for FY 2022–23 to 2025–26, Swachh Vayu Survekshan, MoEFCC, 2023

Cities have been ranked based on performance assessments for the applicable financial year. Specific weightage has been assigned for taking control measures in eight identified sectors. The sectors assigned the highest weightage (20 per cent) include biomass and municipal solid waste burning followed by road dust, vehicle emissions and industrial emissions. Only 2.5 per cent of the weight is given to improving PM10 concentrations and public awareness campaigns, whereas dust from C&D waste is given a 5 per cent weightage (see *Table 12: Sector-wise specific weightage).*

Table 12: Sector-wise specific weightage

Sr. no.	Sector	Category 1	Category 2	Category 3
		>10L Population cities (in %)	3-10 L Population cities (in %)	< 3 L population cities (in %)
1	Biomass and municipal solid waste burning	20	20	20
2	Road dust	20	20	25
3	Dust from construction and demolition waste	5	5	5
4	Vehicular emissions	20	20	15
5	Emissions from industries	20	15	15
6	Other emissions	10	15	15
7	IEC activities/public awareness	2.5	2.5	2.5
8	Improvement in PM10 concentrations	2.5	2.5	2.5

Source: Revised Guidelines for Ranking of Cities under NCAP for FY 2022-23 to 2025-26, Swachh Vayu Survekshan, MoEFCC, 2023

During the 2023 assessment, under the population category 1 (cities above 10 lakh population), Indore came in first, followed by Agra and Thane. In population category 2 (cities between 3 to 10 lakh population), Amravati ranked first, followed by Moradabad and Guntur. In the third population category (cities under 3 lakh population), Parwanoo was the top scorer, followed by Kala Amb and Angul (see *Table 13: Swachh Vayu Survekshan: Results of 2022 and 2023).*

Table 13: Swachh Vayu Survekshan: Results of 2022 and 2023

Swachh Vayu Survekshan: FY 2022 and 2023 results (FY 1 April to 31 March 2022)				
Category	**Rank**	**Top ranking cities, 2022**	**Top ranking cities, 2023**	**Award cash prize (Rs in crores) for FY 2022**
Category 1: Population above 10 lakh	1st	Lucknow, Uttar Pradesh	Indore, Madhya Pradesh	1.50
	2nd	Prayagraj, Uttar Pradesh	Agra, Uttar Pradesh	1.00
	3rd	Varanasi, Uttar Pradesh	Thane, Maharashtra	0.50
Category 2: Population 3 to 10 lakh	1st	Moradabad, Uttar Pradesh	Amravati, Maharashtra	0.75
	2nd	Firozabad, Uttar Pradesh	Moradabad, Uttar Pradesh	0.50
	3rd	Amravati, Maharashtra	Guntur, Andhra Pradesh	0.25
Category 3: Under 3 lakh population	1st	Dewas, Madhya Pradesh	Parwanoo, Himachal Pradesh	0.375
	2nd	Sunder Nagar, Himachal Pradesh	Kala Amb, Himachal Pradesh	0.25
	3rd	Nalagarh, Himachal Pradesh	Angul, Odisha	0.125

Source: Swachh Vayu Survekshan, 2023

Swachh Vayu Survekshan has provided detailed guidelines on the nature of interventions required for scoring. This can be a third-party assessment. The submissions of information from cities need to be signed by the ULBs or SPCBs. It is however not possible to assess the scope and depth of action implemented by the cities to understand what is winning. The details of the action are self-reported by the cities on the PRANA portal. This information is not publicly accessible. Even though this ranking of cities is based on the action, lack of transparency is a hindrance in creating a learning curve for other cities.

Some of the indicators will require improved framing and more explicit alignment with the guidance framework and service-level benchmarks developed by the respective ministries. Otherwise, they will not be able to influence the direction and scale of change needed for improvement in air quality.

ASSESSMENT FRAMEWORK PROVIDED BY THE SWACHH VAYU SURVEKSHAN

Here is the snapshot of the indicators outlined for the assessment framework for 47 cities with more than 10 lakh population. About 200 marks have been distributed across the indicators. The scoring is done according to the following slabs: > 80 to 100%; >60 to 80%; >40 to 60%; >20 to 40%; >10 to 20%

The individual indicators for each sector can be grouped as follows:

Waste management: Per cent of waste (including plastic and C&D) generated and collected and processed, and per cent of legacy waste processed.

Road dust: Percentage of all types of roads maintained/pothole-free roads; pavements made against total length of road shoulders; roads metalled against total length of unmetalled roads; area covered by greenbelt against total area/road length to be greened including along roadsides and on dividers; road length swept including through mechanical road sweepers; construction sites where the guidelines for dust mitigation were compiled as per the CPCB guidelines.

Vehicles and transport: Monitoring of PUC for vehicles and data on compliances, number of vehicles monitored vis-a-vis registered vehicles. Adequate number of PUC testing centres; percentage of PUC testing centres integrated with centralized servers; registered vehicles with PUC certificate. Number of fuel stations inspected for fuel adulteration.

Public transport: Public transport infrastructure (per one lakh population)

E-mobility: Registered vehicles (e-buses, 3-wheelers, 2-wheelers, 4-wheelers, etc.); EV charging infrastructure in the city (Develop charging infrastructure for EVs as per the growth of EV).

Industry: Percentage of Online Continuous Emission Monitoring Systems (OCEMS) with respect to total number of industries; industrial clusters complying with emission norms; industries shifted to clean fuel; brick kilns shifted to zigzag including within 10 km from sides of the ULB limits.

Household fuel: Percentage of houses covered under LPG/PNG scheme; percentage of wards covered under door-to-door collection facility

Electricity supply

Awareness and outreach: Public grievances redressal system: percentage of air pollution related complaints resolved against registered; advertisements on Dos and Don'ts on social media, each on X, Facebook, Instagram, and also permanent displays on departments' websites; percentage of houses covered for door-to-door campaign (segregation of waste at source, etc.); percentage of schools covered for awareness programmes

Improvement in PM 10 concentration: Integrated value of NAMP & CAAQMS on a year-on-year basis, i.e., improvement in past 1 year. NAAQS or National Ambient Air Quality Standards for PM10 = 60 $\mu g/m^3$

Cities ranking high in action under Swachh Vayu Survekshan do not match with cities scoring high in air quality improvement under XV-FC and NCAP

Given the constantly evolving metrics for NCAP cities and XV-FC cities, it becomes difficult to compare the performance of all cities based on common metrics. It also becomes challenging to correlate the air quality improvement in one city and level of action in others.

It is very difficult to establish relations between the cities that have been ranked high on the basis of PM10 reduction and those which have been ranked high for implementing more measures. The two do not always match (see *Table 14: Ranking of cities in Swachh Vayu Survekshan compared to ranking in XV-FC and NCAP).*

A comparison of the performance of cities under the three verticals—SVS, NCAP and XV-FC—in 2022–23 provides an interesting insight (*see Annexure 6).* For instance, in 2022–23, Indore, Srinagar, Bhopal and Trichy that ranked best in the population category of more than 10-lakh population, are also among the best in NCAP and XV-FC. Similarly, among the cities with 3 to 10 lakh population, Moradabad, Firozabad, Ujjain and Bareily are at the top under SVS and NCAP. Among the cities with less than 3 lakh population, Parwanoo and Raibareli are also at the top ranks. Thus, as per the two sets of official rankings, these cities match action with PM10 improvement.

However, there are several other cities that have performed well and are in the top rank under the SVS programme for implementing the policy measures but they are at the bottom rank for reducing PM10 levels under the NCAP and XV-FC verticals. Cities like Agra, Ghaziabad, Jabalpur and Meerut have performed well under SVS for taking action, but they have performed poorly for reducing PM10 levels under the NCAP programme. Delhi ranked nine under SVS for taking action but is at the bottom scoring zero under NCAP assessment of PM10 improvement. Similarly, Amravati, Guntur and Rajahmundry are best performers under SVS but at the bottom scoring zero under NCAP assessment. Among the smaller cities, Kala Amb, Angul and Talcher are the best performers under the SVS for taking action in their respective categories, but are at the bottom under NCAP category for reducing PM10 (*see Annexure 6).*

Thus, the city noted for more action may not necessarily show improvement in PM10 levels. Therefore, the system is not helping to convey the scale of action needed in each sector to make a difference to the air quality. There is no system of

putting out the quantitative and qualitative detail of the action in the public domain. It is therefore not possible to assess the adequacy of the action and the potential impact of the action on air quality. As part of the performance assessment, there is no system of estimating emissions reduction to correlate with the air quality gains.

To avoid the risk of attributing success to the annual changes in PM10 levels due to meteorological and atmospheric changes, it is necessary to convey the scale and nature of action contributing to the air quality changes.

This clearly requires rethinking about the overall metrics for performance grant and finding ways of incentivizing real action on ground. It is necessary to put out the details of action as per the indicators provided by the SVS. That can help to assess the adequacy and scale of action that can make a difference to air quality.

Table 14: Ranking of cities in Swachh Vayu Survekshan compared to ranking in XV-FC and NCAP

Best performing cities							**Least performing cities under different assessments (Several best performing cities under Swachh Vayu Survekshan fall in this category)**
Swachh Vayu Survekshan (Based on sector-wise activities & PM10 data)			**XV-FC, 2022-2023 (Based on PM10 & AQI data)**		**NCAP, 2022-2023 (Based on PM10 data)**		
Population-wise category	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**	**2023**
Category I- Above 10 lakh plus population	Lucknow (Rank 1)	Indore (Rank 1)	Allahabad (100)	Ahmedabad (100)	Sunder Nagar (733)	***Byrnihat (1120)***	**Least performing cities under NCAP –** **Delhi,** Chandigarh, Jhansi, Jammu, Noida, Hubli Dharwad, Sangli, Guwahati, Guntur, **Rourkela, Cuttack, Angul, Talcher, Dewas,** Bhubneshwar, Nellore, **Guntur, Sunder Nagar, Kala Amb, Sagar, Paonta Sahib, Jhansi,** Rishikesh, Balasore, Kashipur, Udaipur, Chitoor, Nagaon, Jalgaon, Davanagere, Dimapur, Ongole, Kurnool, Korba, Kadapa, **Vizianagaram,** Gaya, Eluru, Srikakulam, Gajraula, Baddi, Anpara, Gobindgarh, Dera Bassi, Sangareddy, Jalna, Chandrapur, Akola, Damtal, Muzaffarpur, Sangli, Solapur, Guwahati, Baddi, Kohima
	Prayagraj (Rank 2)	Agra (Rank 2)	Lucknow (100)	Rajkot (100)	Latur (625)	Nalgonda (567)	
	Varanasi (Rank 3)	Thane (Rank 3)	Varanasi (100)	Varanasi (100)	Solapur (620)	***Thoothukudi (350)***	
		Srinagar (Rank 4)		Dhanbad (100)	Naya Nangal (567)	Silchar (350)	
		Bhopal (Rank 5)	Jaipur (75)	Chennai (75)	Talcher (500)	Bareily (346)	
		Trichy (Rank 6)	***Kota (75)***	Trichy (75)	Gorakhpur (445)	Durgapur (288)	
		Vadodara (Rank 7)	Vijaywada (75)	Raipur (75)	Amravati (440)	Gulburga (275)	
		Ahmedabad (Rank 8)	Raipur (75)	Nashik (75)	Nalagarh (414)	Srinagar (214)	
		Delhi (Rank 9)	Ahmedabad (75)	Vijayawada (75)	Nellore (400)	Haldia (200)	
		Mumbai (Rank 10)	Rajkot (75)	Madurai (75)	***Thoothukudi (400)***	Firozabad (194)	

Best performing cities							Least performing cities under different assessments (Several best performing cities under Swachh Vayu Survekshan fall in this category)
Swachh Vayu Survekshan (Based on sector-wise activities & PM10 data)			XV-FC, 2022-2023 (Based on PM10 & AQI data)		NCAP, 2022-2023 (Based on PM10 data)		
Population-wise category	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**	**2023**
Category II- Above 3 to 10 lakh population	Moradabad (Rank 1)	**Amravati (Rank 1)**	Surat (75)	Bengaluru (75)	Moradabad (384)	Moradabad (168)	
	Firozabad (Rank 2)	Moradabad (Rank 2)	Vadodara (75)	Durg Bhilainagar (75)	Firozabad (383)	Kalinga Nagar (167)	
	Amravati (Rank 3)	**Guntur (Rank 3)**	Jamshedpur (75)	Aurangabad (75)	Anantapur (367)	Gorakhpur (152)	
		Firozabad (Rank 4)	**Ranchi (75)**	Nagpur (75)	Raebareli (345)	Nalagarh (114)	**Least performing cities under XV-FC- Agra,** Asansol, Gwalior, Faridabad, **Lucknow,** Meerut, Ghaziabad, Kanpur, Jodhpur, Patna and Vasai-Virar
		Ujjain (Rank 5)	Bengaluru (75)	Pune (75)	Khurja (335)	Raebareli (110)	
		Bareily (Rank 6)	Bhopal (75)	Hyderabad (75)	***Kohima (325)***	***Jalandhar (100)***	
		Jhansi (Rank 7)	**Gwalior (75)**	Indore (75)	Gajraula (363)	Latur (100)	
		Navi Mumbai (8)	Indore (75)	Visakhapatnam (75)	Srinagar (275)	Nalbari (100)	**Least performing cities under Swachh Vayu Survekshan, 2023-**
		Sagar (Rank 9)	Jabalpur (75)	***Kolkata (75)***	Rishikesh (267)	Parwanoo (100)	**Category 1 (Above 10 lakh population)-** ***Kolkata***, Jodhpur, Asansol, Amritsar, Chennai, ***Ranchi, Kota,*** Auranganad, Gwalior, Jamshedpur, Howrah, Madurai, Faridabad
		Cuttack (Rank 9)	Aurangabad (75)	Jabalpur (75)	Cuttack (233)	Sibsagar (100)	
		Rourkela (Rank 10)	Mumbai (75)	***Kota (75)***	Dehradun (223)		
Category III- Under 3 lakh population	**Dewas (Rank 1)**	Parwanoo (Rank 1)	Nagpur (75)	***Amritsar (75)***	Dewas (200)		**Category II (3 to 10 lakh population)**- Ulhasnagar, Akola, Jalgaon, Devanagere, Sangli, ***Jalandhar, Guwahati,*** Jammu, Patancheruvu
	Sunder Nagar (Rank 2)	**Kala Amb (Rank 2)**	Nashik (75)	Mumbai (75)	Chitoor (200)		
	Nalagarh (Rank 3)	**Angul (Rank 3)**	Pune (75)	Vadodara (75)	Alwar (188)		
		Raebareli (Rank 4)	Amritsar (75)	Surat (75)	***Guwahati (167)***		
		Talcher (Rank 5)	Ludhiana (75)	***Ranchi (75)***	***Akola (133)***		
		Dewas (Rank 6)	Chennai (75)	Jaipur (75)	Bhubaneswar (117)		**Category III (Under 3 lakh population)-** ***Byrnihat, Thoothukudi,*** Jalna, Dera Bassi, ***Kohima***
		Haldia (Rank 7)	Meerut (75)	***Jamshedpur (75)***	Bareily (114)		
		Vizianagaram (Rank 8)	Agra (75)	Bhopal (75)	Parwanoo (100)		
		Paonta Sahib (Rank 9)	Asansol (75)		Sibsagar (100)		
		Naya Nangal (Rank 10)	**Kolkata (75)**		Sangareddy (100)		

Source: Compiled by CSE from multiple sources.

Notes: Ranking based on the assigned scores as per different assessments.

1. **NCAP cities assessment:** Performance factor score above 100 (best performing), >80–100 (good performing), >40–80 (average performing) and below 40 (least performing)
2. **XV-FC cities assessment:** Performance score between >75–100 (best performing), >50–75 (good performing), >25–50 (average performing) and below 25 (least performing)
3. **Swachh Vayu Survekshan 2023 assessment:** 1 to 5 ranking (best performing), 6–20 ranking (good performing), 21–35 ranking (average performing), 35 and above (least performing)

Bold text: Best performing under Swachh Vayu Survekshan but least/worst performing under NCAP/XV-FC

Bold Italic text: Best Performing under NCAP/XV-FC but least performing under Swachh Vayu Survekshan

Lessons from the ongoing National Clean Air Programme and the way forward

PM10 based performance monitoring shifts focus towards dust control

Even though the original NCAP had set the air quality targets for both PM10 and PM2.5 reduction, only PM10 is currently considered for assessing the performance of cities. PM10 is the coarser fraction of the particles and is largely influenced by wind-blown dust. PM2.5, a smaller subset of PM10, comes largely from combustion sources and severely impacts health.

It is argued that this reliance on PM10 for evaluation is due to the more widespread availability of manual monitoring networks and data across cities. Comparatively, the capacity to monitor PM2.5 is more limited as the number of continuous ambient air quality monitoring (CAAQM) stations capable of generating real-time data is still not adequate across cities.

Currently, all 131 NCAP cities have manual monitors that can generate PM10 data under the National Air Monitoring Programme (NAMP). In contrast, about 100 NCAP cities have CAAQM that can generate real-time PM2.5 data. Nationally, as of October 2023, there are 931 manual stations under NAMP and 516 real-time CAAQMS. Out of these 512 manual monitoring stations and 344 CAAQM stations are in the NCAP cities.

Yet, under Swachh Vayu Survekshan, cities have integrated data from manual and real-time monitoring stations for PM10 to assess the improvement on yearly basis.[15] This practice of combining data from manual and real-time monitors requires scientific assessment.

Nonetheless, all 49 XV-FC cities can immediately adopt PM2.5 as the basis of performance evaluation as they are already required to consider improvement in PM10 levels as well as the increase in the number of good air days linked to AQI for their performance-linked funding. AQI estimation requires data from real-time monitors.

However, to enable this process, CPCB will have to immediately develop and adopt the protocol for constructing longer term trends for pollutants based on real-time data. Currently, the system exists only for daily AQI estimation based on real-time data.

In any case, most of the future expansion in the monitoring network will be based on real-time monitors. Therefore, integrating them in the compliance framework will be critical. In fact, it is said that some cities were not included in the original list of the non-attainment cities under the NCAP as they did not have manual monitors. For instance, Haryana's cities do not feature in the non-attainment cities list as they did not have manual monitors and data since 2015. Very limited manual monitoring in the National Capital Region (NCR) has resulted in identification of only four cities as the non-attainment cities that include Ghaziabad, Noida, Khurja and Alwar. However, Faridabad has recently been added as a million-plus city to the NCAP list.

As the PM10 trend is the only benchmark for assessing change, CPCB has disaggregated the PM10 reduction target for each city depending on their current levels. The city-wise PM10 targets are fixed for the years 2021–22 to 2025–26 for 90 cities against the base year of 2019–20, expecting maximum reduction with best efforts (see *Table 15: Classification of cities based on the city-wise targets for PM10 reduction recommended by CPCB* and *Table 16: City-wise targets for PM10 reduction recommended by CPCB compared to the base year of 2019–20*).

It may be noted that the average annual PM10 concentration has been calculated after removing 2 per cent outliers for both years. 98 percentile has been considered to calculate the average annual PM10 and AQI data to represent the air quality and reduction in a city.[16] It means 2 per cent extreme/worst conditions (7 to 8 days, out of 365) have not been taken into consideration.

It is challenging to independently assess the trend in PM10 concentration based on manual monitoring because raw data from the manual monitors is not available in the public domain. It is also difficult to ascertain the extent to which the manual data is meeting the quality control parameters laid down by the CPCB in terms of minimum days of data generation per year (104 days).

However, the PRANA portal has reported the PM10 data for all the NCAP cities for the year 2022–23. This shows that as per the CPCB target for 2025–26, 24 highly polluted cities need to reduce their PM10 concentrations by 30 to 45 per cent. But these cities will remain in the critical category even after the target reduction of 2025–26 as their PM10 concentrations will still be 1.5 times higher than the

permissible limits. These cities include Khurja, Moradabad, Gorakhpur, Delhi, Raniganj, Noida, Bareilly, Firozabad, Dehradun, Anpara, Gajraula, Howrah, Durgapur, Raebareli, Jammu, Rishikesh, Gobindgarh and Baddi.

Table 15: Classification of cities based on the city-wise targets for PM10 reduction recommended by CPCB (base year 2019–20)

Name of the cities	No. of cities	Expected target to reduce PM10 concentration from 2021–22 to 2025–26 (%)
Gorakhpur, Moradabad, Firozabad, Khurja, Gajraula	5	40–45%
Delhi, Raniganj, Noida, Bareily, , Dehradun, Anpara	6	35–40%
Howrah, Srinagar, Jalandhar, Alwar, Durgapur, Udaipur, Raebareli, Jammu, Rishikesh, Kashipur, Gobindgarh, Baddi, Muzaffarpur	13	30–35%
Chandigarh, Rourkela, Guwahati, Jhansi, Cuttack, Bhubaneswar, Kolhapur, Ujjain, Amravati, Solapur, Ulhasnagar, Gulburga, Hubli-Dharwad, Barrackpore, Khanna, Patiala, Jalna, Chandrapur, Dewas, Badlapur, Nagaon, Patancheruvu, Balasore, Thoothukudi, Dimapur, Latur, Nalagarh, Talcher, Kalinga Nagar, Naya Nangal, Dera Bassi, Byrnihat, Angul, Sangareddy, Kohima	35	25–30%
Thane, Sangli, Nellore, Guntur, Gaya, Sagar, Haldia, Pathankot/ Dera Baba, Vizianagaram, Akola, Srikakulam, Eluru, Devanagere, Ongole, Anantapur, Nalgonda, Rajahmundry, Jalgaon, Kurnool, Korba, Chitoor, Navi Mumbai, Kadapa, Silchar, Paonta Sahib, Nalbari, Sunder Nagar	27	20–25%
Prwanoo, Sibsagar, Damtal, Kala Amb	4	No target
Total	90	

Source: Compiled by CSE. Data based on PRANA Portal- Amendment in guidelines for the release and utilization of funds under NCAP, MoEFCC, 25 August 2022

Table 16: City-wise targets for PM10 reduction recommended by CPCB compared to the base year of 2019–20

Sr. no.	City/Town	Annual average PM10 (µg/m^3)	Annual target given by CPCB for PM10 (µg/m^3)	Annual target given by CPCB for PM10 levels (µg/m^3)	Expected target reduction from 2021–22 to 2025–26 (µg/m^3)	Expected target percentage reduction (45–20%) from 2021–22 to 2025–26	Expected level of PM10 in 2025–26 (µg/m^3)
		2019-20 (Base year)	2021-22	2022-23			
Population more than 10 lakh							
1	Delhi	178	164	151	65	37%	113
2	Howrah	136	127	118	43	32%	93
3	Srinagar	122	114	107	37	30%	85
4	Chandigarh	88	83	79	23	26%	65
5	Thane	74	70	67	18	24%	56

Sr. no.	City/Town	Annual average PM10 (µg/m^3)	Annual target given by CPCB for PM10 (µg/m^3)	Annual target given by CPCB for PM10 levels (µg/m^3)	Expected target reduction from 2021–22 to 2025–26 (µg/m^3)	Expected target percentage reduction (45–20%) from 2021–22 to 2025–26	Expected level of PM10 in 2025–26 (µg/m^3)
		2019-20 (Base year)	2021-22	2022-23			
Population 5–10 lakh							
6	Gorakhpur	280	249	222	130	46%	150
7	Moradabad	247	222	200	108	44%	139
8	Firozabad	205	187	170	81	40%	124
9	Noida	203	185	169	79	39%	124
10	Bareily	178	164	151	65	37%	113
11	Dehradun	166	153	141	59	36%	107
12	Jammu	146	136	126	48	33%	98
13	Durgapur	129	121	113	40	31%	90
14	Jalandhar	118	111	104	35	30%	83
15	Rourkela	110	103	97	31	28%	79
16	Guwahati	106	100	94	30	28%	76
17	Jhansi	102	96	90	28	27%	74
18	Cuttack	102	96	90	28	27%	73
19	Bhubaneswar	98	92	87	26	27%	71
20	Kolhapur	90	85	80	23	26%	66
21	Ujjain	88	83	79	23	26%	65
22	Amravati	88	83	79	23	26%	65
23	Solapur	86	81	77	22	26%	64
24	Ulhasnagar	85	81	77	21	25%	63
25	Gulbarga	82	78	74	21	26%	61
26	Hubli-Dharwad	76	72	68	19	25%	57
27	Sangli	67	64	61	16	24%	51
28	Nellore	67	64	61	16	24%	51
29	Guntur	57	54	52	13	23%	44
Population 1–5 lakh							
30	Khurja	236	213	192	101	43%	135
31	Raniganj	174	160	147	63	36%	112
32	Raebareli	152	141	131	51	34%	101
33	Rishikesh	135	126	118	42	31%	92
34	Udaipur	130	121	113	41	32%	89

Sr. no.	City/Town	Annual average PM10 (µg/m^3)	Annual target given by CPCB for PM10 (µg/m^3)	Annual target given by CPCB for PM10 levels (µg/m^3)	Expected target reduction from 2021–22 to 2025–26 (µg/m^3)	Expected target percentage reduction (45–20%) from 2021–22 to 2025–26	Expected level of PM10 in 2025–26 (µg/m^3)
		2019-20 (Base year)	2021-22	2022-23			
35	Kashipur	126	118	110	39	31%	87
36	Alwar	125	117	110	38	30%	87
37	Muzaffarpur*	124	116	109	37	30%	87
38	Barrackpore	106	100	94	30	28%	76
39	Khanna	106	100	94	30	28%	76
40	Patiala	98	92	87	27	28%	72
41	Jalna	95	90	85	25	26%	70
42	Chandrapur	90	85	80	23	26%	67
43	Dewas	89	84	79	23	26%	66
44	Badlapur	89	84	79	23	26%	66
45	Nagaon	88	83	79	23	26%	65
46	Patancheruvu	87	82	78	23	26%	64
47	Balasore	86	81	77	22	26%	64
48	Thoothukudi*	84	80	76	21	25%	63
49	Dimapur	83	79	75	21	25%	62
50	Latur	82	78	74	21	26%	61
51	Gaya	79	75	71	19	24%	59
52	Sagar	72	68	65	17	24%	54
53	Haldia	71	68	65	17	24%	54
54	Pathankot/ Dera Baba*	70	67	64	16	23%	53
55	Vizianagaram	67	64	61	16	24%	52
56	Akola	67	64	61	16	24%	51
57	Srikakulam	65	62	59	15	23%	50
58	Eluru	64	61	58	14	22%	49
59	Devanagere	63	60	57	14	22%	49
60	Ongole	60	57	54	14	23%	47
61	Anantapur	60	57	54	13	22%	46
62	Nalgonda	59	56	53	13	22%	46
63	Rajahmundry	59	56	54	13	22%	46
64	Jalgaon	56	53	51	12	21%	44

Sr. no.	City/Town	Annual average PM10 (µg/m^3)	Annual target given by CPCB for PM10 (µg/m^3)	Annual target given by CPCB for PM10 levels (µg/m^3)	Expected target reduction from 2021–22 to 2025–26 (µg/m^3)	Expected target percentage reduction (45–20%) from 2021–22 to 2025–26	Expected level of PM10 in 2025–26 (µg/m^3)
		2019-20 (Base year)	2021-22	2022-23			
65	Kurnool	56	54	52	12	21%	43
66	Korba	52	50	48	11	21%	41
67	Chitoor	52	50	48	11	21%	40
68	Navi Mumbai	51	49	47	11	22%	40
69	Kadapa	47	45	43	10	21%	37
70	Silchar	44	42	40	9	20%	35
71	Gajraula	211	192	175	85	40%	126
72	Anpara	171	158	146	61	36%	110
73	Baddi	133	124	116	41	31%	91
74	Gobindgarh	127	119	111	39	31%	88
75	Nalagarh	115	108	101	33	29%	82
76	Talcher	107	101	95	30	28%	76
77	Kalinga Nagar	104	98	92	29	28%	75
78	Naya Nangal	99	93	88	27	27%	72
79	Dera Bassi	99	93	88	27	27%	72
80	Byrnihat	98	92	87	27	28%	72
81	Angul	95	90	85	25	26%	69
82	Sangareddy	85	80	76	22	26%	63
83	Kohima	80	76	72	20	25%	60
84	Paonta Sahib	78	74	70	19	24%	59
85	Nalbari	75	71	68	18	24%	57
86	Sunder Nagar	68	65	62	16	24%	52
87	Parwanoo	59	-	-	-	-	59
88	Sibsagar	55	-	-	-	-	55
89	Damtal	50	-	-	-	-	50
90	Kala Amb	50	-	-	-	-	50

Source: Compiled by CSE. PRANA Portal: Minutes of thirteenth meeting of implementation committee for NCAP, CPCB, 26 June 2023 & Amendment in guidelines for the release and utilization of funds under National Clean Air Program (NCAP), MoEFCC, 25 August 2022

Notes: 1. Cities with population less than 1 lakh and meeting PM10 standards of 60 µg/m^3 will continue to maintain or reduce.

2. The target for year 2021–22 is in relation to the base year of 2019–20.

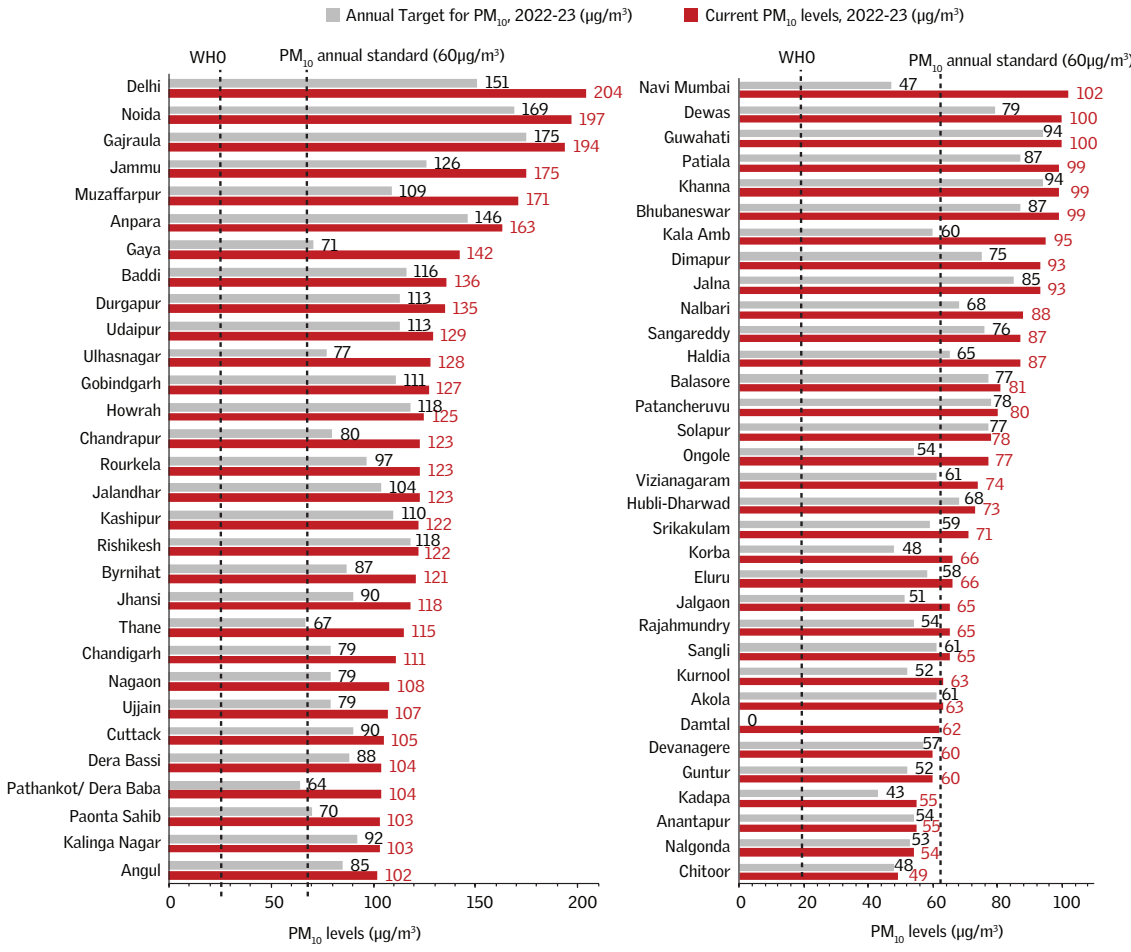
3. The target for subsequent years is with respect to preceding years.

The colour coding index for the above table is as follows:

Expected target PM10 reduction (%) needed, 2021–22 to 2025–26	PM10 level stage	No. of cities
No reduction needed	Moderate	4 cities
20 to 30% reduction	High	62 cities
30 to 40% reduction	Very High	19 cities
40% & above	Critical	5 cities

As per the current PM10 levels, 64 out of 90 cities have not achieved the annual targets for FY 2022–23 under NCAP (see *Graph 7: Annual target not achieved by non-attainment cities, 2022-23)*. During 2022–23, PM10 concentrations in the top ten polluted cities were 2 to 3.5 times higher than the prescribed standards and 8 to 14 times higher than the WHO standards. The top ten polluted cities

Graph 7: Annual target not achieved by non-attainment cities, 2022-23

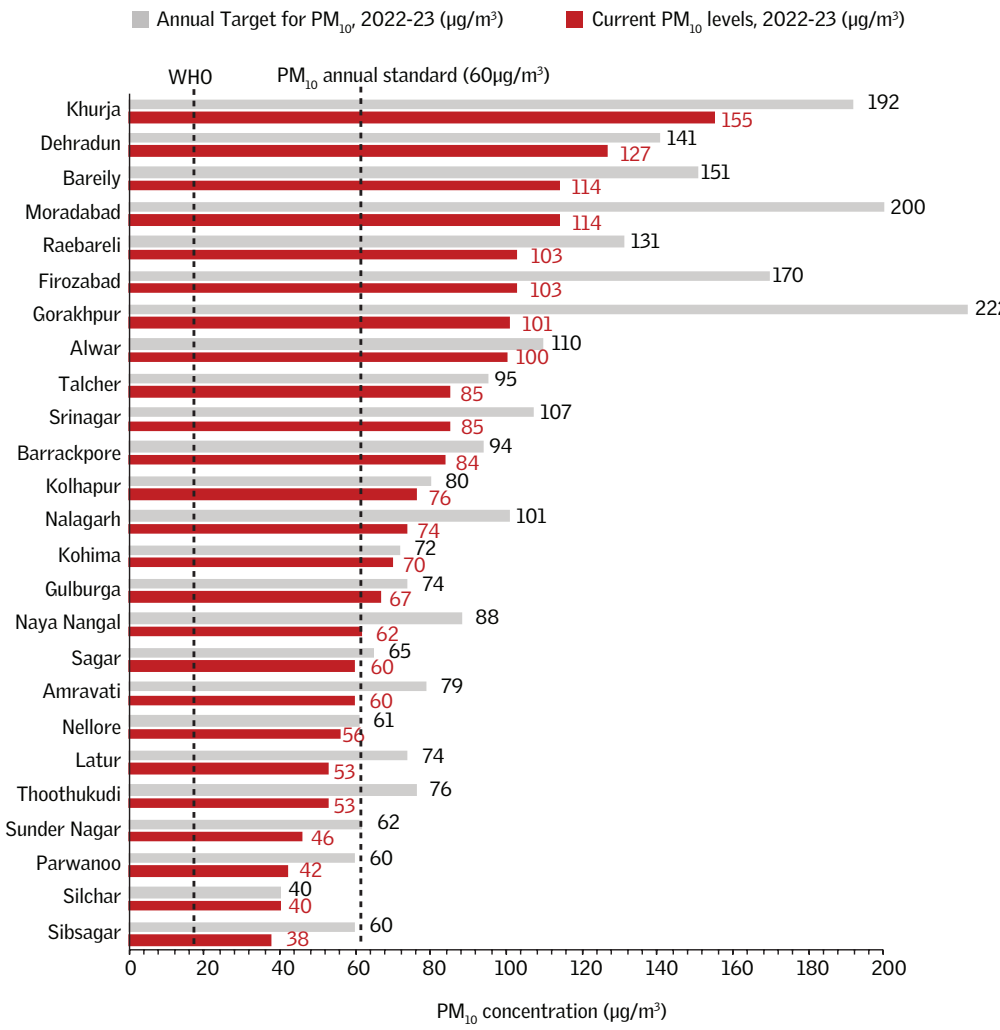


Source: Compiled by CSE. Data based on PRANA Portal.

include Delhi, Noida, Gajaula, Jammu, Muzaffarpur, Anpara, Gaya, Baddi, Durgapur and Udaipur.

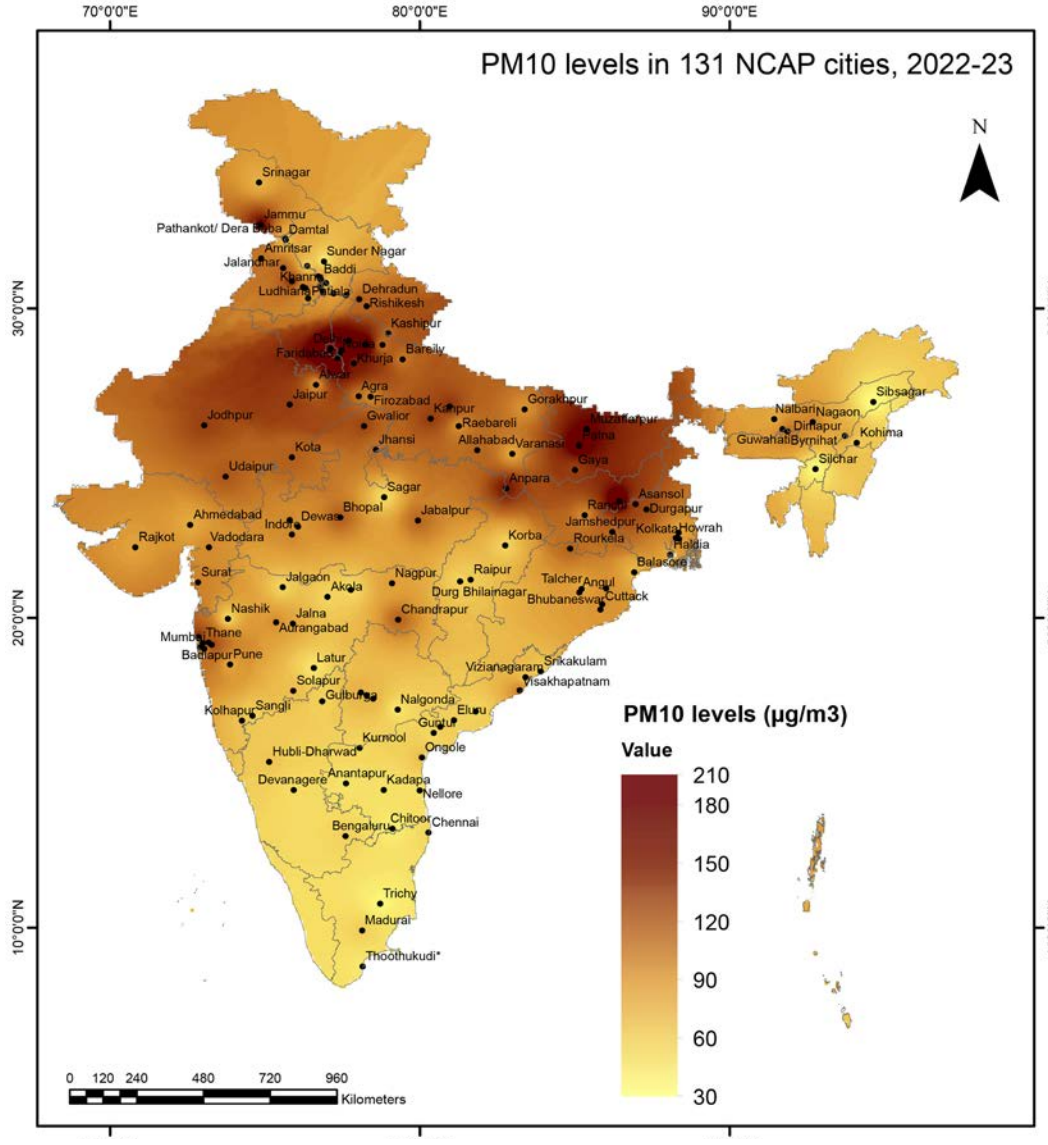
Only 25 cities have achieved the annual targets for FY 2022–23 under NCAP (see *Graph 8: Annual target achieved by NCAP cities, 2022–23*). During 2022–23, there were nine cities that met the annual standards of PM10 concentration. These include Sibsagar, Silchar, Parwanoo, Sundar Nagar, Thoothikudi, Latur, Nallore, Amravati and Sagar. These do not include the cities from the Indo-Gangetic Plains. There is a wide variation in PM10 levels across the country (see *Map 1: Annual Average PM10 concentrations in 131 NCAP cities, 2022–23).*

Graph 8: Annual target achieved by NCAP cities, 2022–23



Source: Compiled by CSE. Data based on PRANA Portal

Map 1: Annual Average PM10 concentrations in 131 NCAP cities, 2022–23



Source: Created by CSE. Data based on PRANA Portal & Minutes of thirteenth meeting of implementation committee for National Clean Air Programme, CPCB, 26 June 2023

Sector-wise fund utilization—Dust management takes major share of funding

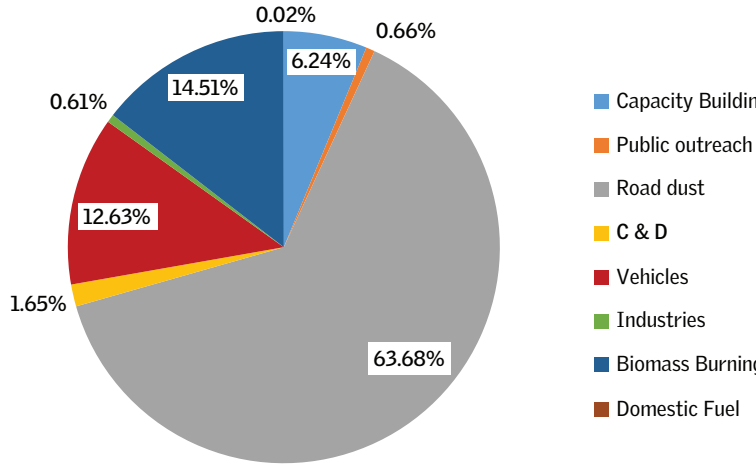
The available information on sector-wise spending shows that, out of Rs 4,974.08 crore, a significant amount of funding has been utilized in the road dust sector (64 per cent), followed by biomass burning (14.51 per cent) and the vehicle sector (12.63 per cent). In contrast, only 0.61 per cent has been spent on the industry sector. Additionally, a mere 6 per cent of the fund is allocated for capacity building,

indicating a limited allocation to improving abilities, assets and instruments for improved regulation of air pollution. The efforts towards addressing industrial emissions are negligible and solid fuels in the household sector are not even on the anvil (see *Graph 9: Sector-wise fund utilized in 131 NCAP cities).*

Thus, road dust mitigation measures that include paving, road widening, pothole repair, water sprinkling, mechanical sweepers, etc. have taken the lion's share of the funds for clean air action.

Very little is being spent on industrial and vehicular pollution. Only some states—driven by larger convergence programmes like FAME 2 for electric vehicles—have spent some funds on developing electric charging stations or buying electric buses. Some money has been spent on bicycle tracks and multi-level car parks, but these are not scalable interventions in most cities.

Graph 9: Sector-wise fund utilized in 131 NCAP cities (as on 24.11.23)



Source: PRANA Portal: Minutes for 15th Meeting of Implementation Committee for National Clean Air Programme, 24 November 2023

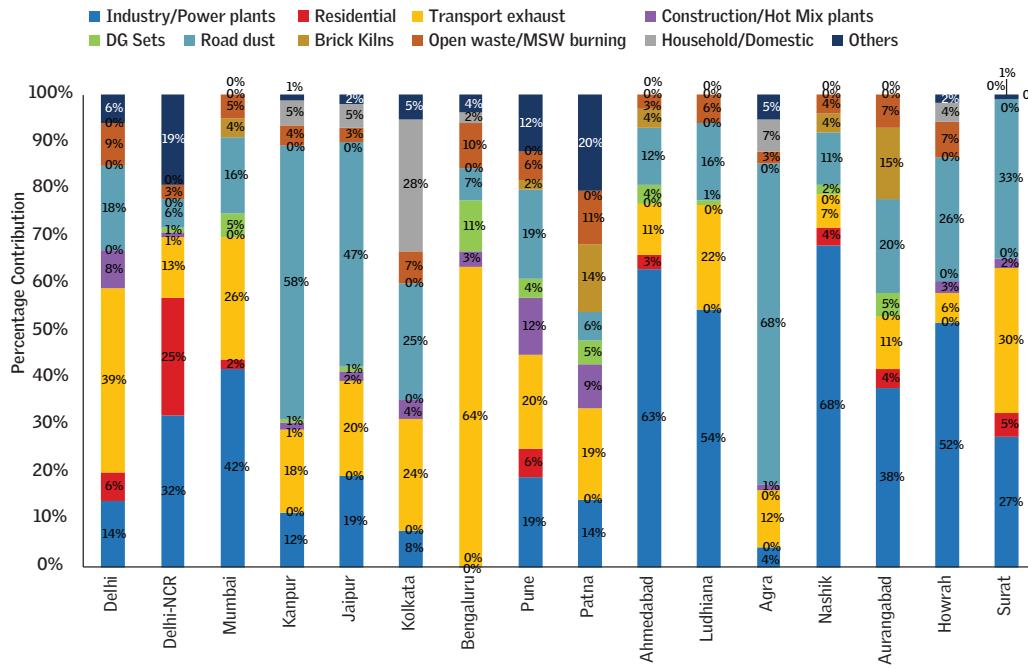
Taking PM10 as the benchmark for air quality improvement has a risk of diverting attention and resources towards coarse dust management that is highly impacted by wind-blown and natural dust. While dust can also get toxic with coating of pollutants from combustion sources and requires management, the combustion sources will still require strong attention. Currently, laborious efforts are being made to assign city-wise PM10 targets. But PM10 concentration can be hugely impacted by dust episodes and it is difficult to ascertain the impact of action on combustion sources on particulate concentration in the longer term. Dust management needs to be addressed separately.

Make PM2.5 and not PM10 the benchmark for performance-linked funding

From a public health perspective, what matters most is exposure to the smaller and harmful fraction of particulate matter. As an immediate and priority strategy, performance assessment for all million-plus cities should be linked with PM2.5. All these cities have real-time monitors needed for PM2.5 data generation and are already reporting the trend in the number of good air quality days as per the AQI and based on manual as well as real-time data.

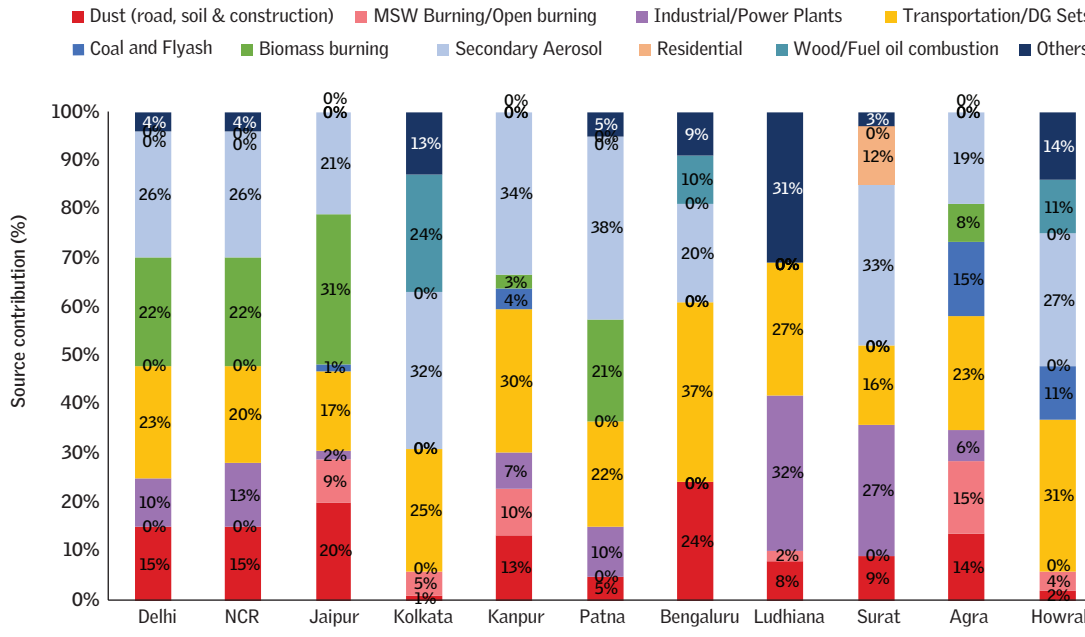
In fact, a review of the available PM2.5 source apportionment studies from different cities shows that while the contribution of road dust to PM2.5 concentration can be high in some northern cities, in most cases contribution of combustion sources—industry, vehicles and waste burning—is significant. Equally important is the share of secondary pollutants formed from nitrogen oxides, sulphur dioxide and other gases. During the winter season, when pollution levels peak in nearly all cities, the share of road dust reduces significantly while that of combustion sources increases dramatically. The regulatory focus needs to shift towards PM2.5 now to mitigate emissions from industry, vehicles, open burning, solid fuels for cooking, incineration, DG sets, etc. (see *Graph 10: PM2.5 evidence from emissions inventories of 16 cities* and *Graph 11: PM2.5 source apportionment during winter in 11 cities*).

Graph 10: PM2.5 evidence from emissions inventories of 16 cities



Source: Various emission inventories of respective cities

Graph 11: PM2.5 source apportionment during winter in 11 cities



Source: Various source apportionment studies and emission inventories of respective cities

Even though source apportionment and inventory studies are the prerequisites of clean air action plans under NCAP, its results are not being interpreted adequately to inform decision making on emissions control. Also, so far, only 49 cities have completed these studies while 82 are in progress. While these studies themselves will require stringent quality control and a degree of standardization, these need to be better utilized to inform action planning and funding strategy.

Moreover, these studies require systematic review and a national meta-analysis to inform policy at the national level. There is poor guidance on how to interpret these studies to inform action. The report of the Steering Committee on Air Pollution and Health Related Issues, MoHFW stated in 2015 that what matters most from a public health perspective is the proximity to the pollution source and duration of exposure. Other studies including that of the Health Effect Institute show that the toxicity of exposure depends on the source of particulates. Particles from coal and diesel combustion for instance are more harmful than windblown dust.

Target for PM2.5 reduction at the city and airshed level will enable more scalable action and also help to address transboundary movement of PM2.5 and secondary particulate.

Going forward, it will be tougher to show impact of action on PM10 levels, which are highly affected by wind-blown dust and specific dust sources. Focus on PM10 should be more source-specific like mining, construction sites, exposed crustal soil, etc. Mining areas will require PM10 management. Currently, the WHO is assessing ways to address and account for dust and dust events.

Most of the future expansion in the monitoring grid will happen based on real-time monitoring. This creates an opportunity to make PM2.5 the basis of benchmarking progress in air quality. In fact, going forward, with grid expansion, the matrix of assessing air quality improvement needs to combine PM2.5, nitrogen dioxide and ozone.

Adopt standardized protocol for air quality trend analysis based on real-time data for establishing compliance under NCAP

While moving towards PM2.5 based performance assessment and use of real-time data, immediate steps are needed to establish the standardized protocol for utilizing real-time data for establishing long-term trends and compliance with the NAAQS.

Currently, the system is ad hoc. There is a wide variation in the number and distribution of monitoring stations in cities. While many cities have 3–5 monitoring stations, mega cities have anywhere between 15–40 stations. There is no guidance on the number and type of stations to be considered for estimating city averages for long-term trends. Also considering that the annual changes in air quality can be highly variable due to the stronger influence of meteorology—in line with international good practices—it will be more meaningful to consider three-year rolling averages. There is therefore a need for a protocol for data analytics to address all these issues.

CPCB needs to put out the criteria and detail out how the annual trends need to be constructed, types of monitors that need to be considered, statistical methods that need to be adopted for data cleaning, missing data that needs to be addressed, data substitution method that needs to be used, averaging time, etc. for trend analysis for compliance. This is not available yet for long-term trend analysis based on real-time data. Currently, the real-time data is utilized only for daily air quality alerts and estimation of air quality index.

For the future expansion of air quality monitoring, the focus should be on real-time monitors instead of manual monitoring. It is also advisable to adopt more advanced monitoring methods like satellite-based monitoring to enable generation of data for data shadow areas.

High score for PM10 improvement in NCAP cities and action-based high rank under Swachh Vayu Survekshan may not match for all cities

The comparison of the two systems (PM10 improvement in NCAP, XV-FC cities and level of action along with the PM10 improvement under Swachh Vayu Survekshan) show that while there are some cities that score well under both the systems, there are also several others that can be best performing for taking sectoral action as per the detailed criteria under Swachh Vayu Survekshan but may be worst performers in terms of improving PM10 levels.

It is quite possible that in some cities the progress in action and improvement in air quality are comparable but may not be proportionate. This may not be the case in several other cities. This therefore requires a more careful assessment of what is the scale of action needed in a specific context of meteorology, level of economic activity, motorization and demography to make a difference to the air quality.

In fact, it is quite possible that only local action cannot help to attain clean air targets or the national ambient air quality standards. Such a relationship is not directly proportional. Action will be needed at a larger airshed level to make an impact. Yet scalable and in-depth sectoral local action is needed to reduce the local contribution to air quality.

Annual changes in PM10 may not adequately mirror the impact of action across all sectors. Cities may have made good progress but it is still limited in scale and quality of action to make an impact on the air quality. But such information is not readily available.

The programme needs to drive large-scale and rapid action across all sectors to improve air quality. The current evaluation system must provide clarity on the scale of action needed to make a difference to the air quality in different climatic zones. Otherwise, there is a risk of incentivizing cities that may not have pursued deeper multi-sector action and yet show improvement in PM10 levels influenced by meteorological factors and largely road dust control.

On the other hand, there can be cities with a matured and diverse set of multi-sector action but that may still not be commensurate with the challenge imposed by the highly concentrated development activities and population in the city or the region, and further constrained by adverse meteorology. In both the cases it is more important to drive the level of action across all key sectors of pollution with appropriate yardsticks.

Swachh Vayu Survekshan ranking and NCAP scoring need to provide transparent details on the level of action across the key sectors of pollution

Currently, the annual release of ranking of cities along with the details of their respective sectoral action and improvement in PM10 concentration is not publicly available with city-wise details. It is therefore not possible to ascertain the level, scale and quality of action in each sector or what it means for the best performing cities to achieve 80–100 per cent of the targets set as per the criteria of the Swachh Vayu Survekshan.

The reports that are available on the PRANA portal from including the information on best practice portal are cursory, broad and in most cases without the requisite quantitative and qualitative detail on the scale and quality of the action taken.

To get an indicative idea, CSE has accessed the information available on the PRANA portal from 2021 onwards and has also accessed ground-level information through engagement with the concerned departments in different cities/states. As this review is not exhaustive for all NCAP cities, specific cities have not been quoted—except those that are publicly mentioned on PRANA portal—to avoid biases.

Overall, it is evident from the quarterly reporting and micro plans of the cities that usually the information provided by the cities includes policy notifications, tendering of projects, enforcement measures in terms of inspection and challans, construction of infrastructure like roads, waste management facilities or parking facilities, and bus procurements. Quantitative information is limited and qualitative information in terms of design detail of interventions is inadequate.

First, it will be useful to classify the interventions as policy and regulations, preparatory stages of action (like tendering/expression of interest etc), level of enforcement and surveillance measures, and final implementation of infrastructure, assets and systems on the ground. While all these steps are important to enable action, maturity of policies and scale of implementation make the difference in air quality. It is important to capture and set the target for the scale of implementation on ground.

Secondly, even though the NCAP framework for performance assessment encourages reporting on all aligned schemes in the concerned sectors under convergence funding, the ability of the cities to capture the full range of ongoing action in all sectors is not that robust. Sometimes, it is possible that even if

more is happening in the city under different schemes and programmes, it is not adequately captured to assess progress due to inadequate information flow between departments.

Sector-wise major initiatives listed in the PRANA portal indicate the nature of action undertaken in sub-sectors of transport, road dust, waste management and other initiatives. This includes action taken under NCAP and XV-FC funding as well as convergence funding related to different sectoral schemes and programmes (see *Table 17: Summary list of sector-wise major initiatives reported on PRANA portal*).

This information is not exhaustive for the listed cities. It is quite possible that more is happening in these cities than what is publicly available on the PRANA portal. But this helps to understand one limited point and that is NCAP's funding is linked more with dust mitigation, while convergence funding in the waste and transport sectors is helping to address the combustion sources.

Table 17: Summary list of sector-wise interventions listed on PRANA portal

Sector	Action
Transport	57 multi-level parking
	2,262 EV charging stations
	5,147 EVs for public transport
	402 intelligent traffic management systems
	406 traffic junctions improvement
	37 ATS and 44 RVSF
	145 bicycle tracks
Road dust	26,375 km end-to-end paving of roads
	22,453 km mechanical road sweeping
	15,526 km repair of roads
	771 water sprinklers
Waste management	65,875 TPD solid waste processing
	115 (16,356 TPD) C&D processing plants
Other initiatives	3,556 ha greening of urban spaces 79 wood crematoriums converted to gas/electric
	23 integrated command and control centres
	47 best practices

Source: PRANA Portal: Minutes for 15th Meeting of Implementation Committee for National Clean Air Programme, 24 November 2023

DELHI-NCR AIR QUALITY: PRANA PORTAL MAY NOT CAPTURE FULL SCOPE OF ACTION IMPLEMENTED

The PRANA portal may not capture the level of action in Delhi and NCR adequately, but the annual report of MoEFCC has special spotlight on the interventions directed by the CAQM in NCR and adjoining areas. While this indicates the level of action initiated post-2021 when the CAQM became operational, there is also a cumulative impact of two decades of action prior to that when the Supreme Court was directing clean air action and Environment Pollution (Prevention and Control) Authority (EPCA) was monitoring and recommending action under the aegis of the Supreme Court.

The MoEFCC has outlined the CAQM action in its latest annual report in 2023–24. This report shows sector-wise action that has been implemented in the NCR part of the four states—Delhi, Haryana, Uttar Pradesh and Rajasthan. It may be noted that the CAQM directives are derived from the comprehensive Clean Air Policy that was issued by CAQM in 2022.

Industrial pollution

- Regular audit and inspection of industry
- Standard list of approved fuels notified and statutory directions issued for implementation by December 2022.
- Out of the 240 industrial areas, 211 have been provided piped natural gas and connectivity, and work is in progress in 29 industrial areas.

Table 18: Status of implementation of approved fuels in industrial areas of the NCR

Industries	Haryana (NCR)	Uttar Pradesh (NCR)	Rajasthan (NCR)	NCT of Delhi	Total in NCR
Number of fuel-based industries	3,141	2,273	522	1,823	7,759
Number of industries shifted to approved fuels	2,954	2,188	484	18,23	7,449
Remaining industries	187	85	38	-	310*

Note: Units reported self-closure or through directions of the state authorities
Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Vehicular pollution

- Phase out of 10-year-old and 15-year-old diesel vehicles—drive against such vehicles
- As of 30 September 2023, there were 3,100 charging stations and 4,793 charging points in NCT of Delhi and 467 charging stations in NCR.
- Statutory direction in November 2022 to mandate only CNG/electric autos with effect from 1.1.2023. Additionally, Haryana, Uttar Pradesh and Rajasthan have been directed to phase out diesel autos by December 2026.
- Bus operations between NCR cities and towns only based on electric, CNG and BS VI buses by November 2023

Table 19: Action on PUC programme

NCR states	Number of PUC centres	Number of PUC issued	Number of challan issued	Overaged 10/15-year-old petrol/diesel vehicles
Delhi	947	36,29,139	164,000	14,687
Haryana-NCR	1,776	29,083,277	11,135	220
Rajasthan-NCR	197	97,193	6,154	148
Urrat Pradesh-NCR	589	14,58,093	22,579	3,058

Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Table 20: Electric mobility

States	Number of electric vehicles (as of 30 September 2023)
Delhi	2,38,056
Uttar Pradesh-NCR	84, 716
Haryana-NCR	75,837
Rajasthan-NCR	13,784

Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Diesel generator sets

- Statutory directions in September 2023 to retrofit DG sets with emissions control systems or replacement with new DG sets meeting the new emissions standards or replace with CNG sets.

Agricultural residue burning

In-situ crop residue management

- Availability and allocation of CRM machines
- High yield short duration paddy variety PUSA 44
- Harvesting schedule staggered to improve machine utilization
- Super SMS mandated with combine harvesters
- Extensive use of bio-decomposer (developed by IARI)

Ex-situ residue management

- Advisory on supply chain mechanism to increase ex-situ utilization of straw
- Direction on 17.3.2023 to all coal-based power plants to include co-generating captive thermal power plants in NCR—at least 5 per cent co-firing of biomass pellets/torrefied pellets (with focus on paddy straw) by 30 September 2023 and 10 per cent by 31 December 2023.
- Alternative use of paddy straw—biomass power projects, co-firing in thermal power plants, feed stock for two ethanol plants, fuel in industrial boilers, waste-to-energy plants, brick kilns, etc.
- Packaging material, agricultural panels, etc.

Table 20: Cumulative paddy residue burning events (15 September–19 November) 2021 to 2023

Punjab			Haryana			Uttar Pradesh			Total		
2021	2022	2023	2021	2022	2023	2021	2022	2023	2021	2022	2023
70, 573	48, 915	34,459 (-30% over 2022)	6,337	3,459	2,085 (-40% over 2022)	115	86	118 (+37% over 2022)	77,032	52,470	36,670 (-30% over 2022)

Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Greening and plantation

Table 21: Targets and achievements – plantation (trees, shrubs, bamboo, etc.)

States	Target 2023–24	Plantation till 30.9.2023
Delhi	95,04,390	62,95,077
Haryana-NCR	98, 93, 797	70,26,065
Rajasthan-NCR	25,89,892	15,19,436
Uttar Pradesh-NCR	1,64,63,497	1,64,63,497
Total	3,84,51,576	3,13,04,075

Source: Annual Report 2023–24, Ministry of Environment, Forest and Climate Change, Government of India

Table 22: Dust control in construction sites

Status of inspection of C&D sites	Delhi	Haryana-NCR	Uttar Pradesh-NCR	Rajasthan-NCR
Number of C&D sites physically inspected	43,674	2,612	1,026	582
Total sites against which environment compensation charged for non-compliance	2,557	96	71	30
Number of sites issued closure notices	206	74	5	21

Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Table 23: Overall enforcement

Total sites inspected	Number of closure direction issued				State-wise closure notices			
	Industry	C&D sites	DG sets	Total	Delhi	Haryana	Uttar Pradesh	Rajasthan
15,933	560	296	41	897	141	267	392	97

Source: Annual Report 2023-24, Ministry of Environment, Forest and Climate Change, Government of India

Pre-2019 action in Delhi-NCR

Before the formation of CAQM, there is precedence of action directed by the Supreme Court and monitored by the EPCA. This primarily targeted energy transition in the transport and industry sectors.

Transport sector

- Replacement of diesel buses, local commercial transport, taxis and autos by CNG in Delhi—expansion of the orbit to NCR
- Phase out of 10-year-old diesel vehicles and 15-year-old petrol vehicles
- Restrictions on truck entry; payment of environment compensation charge on each truck entry; ban on entry of pre-2005 trucks; dedicated fund created from the revenue of ECC
- Pollution cess on big diesel cars and SUVs and on each litre of diesel sold in Delhi and dedicated funds created from the revenue
- Direction to introduce remote sensing for on-road emissions monitoring

Action on industry and power plants

- Ban on pet coke and furnace oil in industry of NCR and four states of NCR. Additionally, Delhi banned coal.
- Push for moving brick kilns to zig-zag technology in NCR
- Closure of all coal-based power plants in Delhi

Comprehensive action

- Enforcement of graded response action plan in 2016
- Enforcement of comprehensive action plan in 2018
- Expansion of real-time air quality monitoring in Delhi and NCR

A CSE review of impact of this energy transition in the transport and industry sectors in Delhi shows that in the transport sector of Delhi, use of high-speed diesel reduced by 46 per cent between 2014–23 and the share of diesel cars dropped from 35 per cent in 2015 to 7.2 per cent in 2023.

Similarly, substantial migration has been reported to natural gas and biomass fuels, replacing coal in industries.

A critical learning here is that the sectoral schemes and programme that have strong legislative and regulatory frameworks, independent and committed funding schemes with explicit policy mandates, and targets and timelines, show more evolved action. This is particularly evident in the waste sector in which the Swachh Bharat Mission (SBM 2.0) and its performance-linked funding for garbage-free cities by 2025 has created a mandate for remediation of legacy dumpsites through bio-mining, segregation, extensive interventions at the level of bye-laws, and augmented capacity for treatment-processing-recycle-recovery to divert maximum waste from reaching the landfill. SBM 2.0 has set the target to 100 per cent source segregation; 100 per cent door-to-door collection of segregated waste from each household; 100 per cent scientific management of all fractions of waste including digital tracking and monitoring of waste management operations and reduction in landfilling of solid waste to a maximum of 20 per cent by 2025.

SBM 2.0's massive fund allocation, which is nearly 1.3 per cent of India's GDP, is propelling more action in cities with ULBs at the lead. This is helping to address issues related to municipal solid waste management to control open burning and landfill fires. Similarly, its focus on C&D waste is helping to scale-up infrastructure for C&D waste recycling. As a result, a rapid review of progress reports and micro action plans show maximum information on waste management in cities compared to other sectors.

Similarly, to some extent, the electric vehicle programme under the central FAME 2 scheme is helping to phase in zero emissions vehicles in cities.

However, in sectors that do not have independent scheme-based funding, like the industry sector, the level of action is business-as-usual, incremental and does not have accelerators. The action in this sector is largely focused on standard setting, audits and inspection. In this sector, regulatory action is expected to drive action in industry. But the reporting mechanism for the industry to capture improvement in emissions control technologies, innovative processes and adoption of clean fuels is not robust enough to capture change on ground.

Summary of sector-wise action listed on the PRANA portal indicates that maximum ground-level infrastructure has been created in the waste and road sectors. Electric vehicle infrastructure is also taking root. But sectoral action is hugely skewed towards convergence schemes and not equitably spread across all sub-sectors. The changes in the industrial sector have not been captured adequately. This demands a much deeper probe into equitable spread of investments to support priority measures across all sectors.

It is also evident that in regions that have been consistently driven by judicial interventions and dedicated air quality governance structures, more accelerated action has been possible. This is evident in Delhi and NCR, where the Supreme Court directives and subsequently the interventions from the CAQM in NCR and adjoining areas have propelled action.

The critical point is that Delhi-NCR has perhaps witnessed the maximum interventions in different sectors over a period of time compared to other cities and regions. And yet Delhi (despite bending the PM2.5 curve) and NCR continue to remain one of the most polluted regions in the country and are still struggling to meet clean air targets.

The concentrated population, economic activities and motorization in the region that is also constrained by the adverse meteorological conditions of a land-locked region (a common challenge in the Indo-Gangetic Plains), make this a challenging region.

This therefore requires CAQM and the NCAP programme to assess the scale and speed of multi-sector action needed to be implemented in a time-bound manner that can bend the pollution curve further to be able to meet the NAAQS round the year in Delhi-NCR. This will address the dichotomy where Delhi ranks among the top ten cities in the Swachh Vayu Survekshan for the level of action taken, yet remains at the bottom for PM10 levels under NCAP scoring.

The NCAP programme must evolve further to help capture and drive the level of multi-sector action needed in all other cities and regions for improvement in PM2.5 levels.

Target and scope of sectoral action requires mainstreaming and better detailing across departments

The objective of clean air action is to ensure accelerated clean energy transition across all sectors including industry, vehicles and households; mobility transition to achieve clean and zero emissions transport and commuting; and circularity to recover resources from all waste streams to close the loop. To be able to achieve these objectives in a time-bound manner, the scope and design of the interventions in each sector require detailed indicators and tied funding.

All concerned departments have already initiated several programmes and schemes but in several cases the target and scope are not adequately detailed out for planning, implementation and departmental fund allocation. In fact, under NCAP, micro action plans require reporting on at least 258 indicators encompassing

road dust, municipal solid waste, construction and demolition waste, vehicles and transport, industry, power plants, urban greening, DG sets, among other sources.

Even though the city plans, micro plans and state plans require to mention the targets for each indicator identified, the on-ground review shows that the sector and indicator-wise target is either missing or inadequate.

In fact, the major thrust of the CPCB indicators for progress reporting is to help cities develop a system for setting annual and quarterly targets for each action and set milestones for each sector to measure progress. Nearly all cities have found it challenging to provide information on all targets for future planning and funding. This requires strategy development for each sector at the state level—with departmental heads—to identify the targets related to regulatory action, infrastructure development, enforcement, capacity building, communication and the requisite funding.

Even though these indicators can be developed further to align with sectoral objectives and make them more robust and composite, the existing ones if followed diligently can also lead to substantial progress (*see Annexure 7*). It has been observed that often the scope of several programmes/schemes and implementation strategies have not been adequately detailed out at the departmental level to be able to earmark budget for new funding and for reporting on all requisite indicators.

This leads to considerable asymmetry in action. The same ULB that is responsible for waste management is also responsible for parking, non-motorized transport, etc. But in the functional plan, these aspects are not integrated for repurposing of funding. As a result, several aspects of the plans remain neglected and under-funded.

Therefore, data generated on several indicators is either limited or absent. This requires review of each relevant programme to align with the expected outcomes. Moreover, for each action it is important to delineate the process of implementation—for instance, project planning, tendering for services and technology as needed; awarding of tenders, inventories and surveys; timeline for construction, etc.—and have process indicators. Reporting on process indicators can show progress.

Sectors without dedicated funding schemes or requiring complex new generation policies show slower progress

The sectors that do not have specific central or state government schemes with regulatory mandates and targets, and committed funding along with monitoring mechanisms, have to rely more on business-as-usual strategies and incremental

increases in state budgets. These sectors do not have the requisite accelerators. This leads to asymmetry in action between sectors and within departments.

This is evident in the transport and industry sectors.

Challenges in the transport sector

Even though the CPCB indicators for transport encompass on-road emissions management, phasing out of old vehicles, electrification, public transport improvement, non-motorized transport and parking policy, these indicators are not well defined for implementation at the state level. There is a minimalist and business-as-usual approach to these strategies.

For on-road emissions management, information is largely confined to the business-as-usual PUC challans, and limited action on phase-out of old vehicles. But these have not translated into state-level fleet renewal and scrappage policies in line with the scrappage and fleet renewal notifications of the Ministry of Road Transport and Highways.

As mentioned earlier, there is some progress in the implementation of the state-level electric vehicle policy as it is backed by the central FAME incentives programme. Only those cities where urban local bodies run city bus services, as in Maharashtra, have taken an additional decision to leverage NCAP funding to expand their electric bus fleet as this falls within their jurisdiction.

With respect to public transport, the reporting largely remains confined to the number of buses introduced in cities. There is little clarity about the guidelines on service level benchmarks for public transport service improvement and multi-modal integration. Therefore, the reporting remains confined to only introduction of new buses without providing adequate information on how the ridership of public transport is expected to scale up for an effective modal shift.

Similarly, there is intermittent information on small corridors of walking and cycling in cities. These do not add up to any sizeable network to make a difference to safe access. Without a clear state or city-level mandate for such infrastructure development, responsible ULBs do not prioritize fund allocation for it, even though they now have dedicated funding for clean air action plans,.

At the same time, indicators related to travel demand management measures such as parking policy—that is included in CPCB's indicators—are not well understood. Cities often take this as a supply side management issue to plan for more parking

to meet the insatiable parking need and report on multi-level car parks. It is not aligned with the principles of the National Habitat Standards for Transport, National Urban Transport policy or Transit Oriented development Policy of MoHUA that has underscored demand management and restraint principles. Most cities have not even framed parking policies and rules to define the demand management principles.

Such a policy would aim at meeting the requirement of parking while also reducing the demand for parking and use of personal vehicles by limiting and demarcating legal parking areas, penalizing illegal parking, introducing dynamic variable parking rates, eliminating free parking, etc. through parking management area plans. But city progress reports do not align with this to enable behavioural change on ground and for it to be a clean air action.

Weaker focus on industry

A rapid review shows that most cities provide very limited information on the action taken on industry and power plants that are substantial sources of air pollution in the vicinity of the city. Even during the plan preparation phase, the hard line drawn around the administrative municipal boundary excluded most industrial sources from the planning process in several cities. The plans have also not paid adequate attention to the small and medium scale units that usually exist in non-confirming areas inside the cities. These are not accounted for as there is no legal recognition of these units.

As a result, the reporting of action on industrial sources and power plants is minimal in progress reports of cities. As noted earlier, some of the city reports available on the PRANA portal show that the key focus is on road dust control, urban greening and activities under waste management. However, this difference also emerges from the nature of towns—industrial and non-industrial (*see Annexure 8*).

Only if a non-attainment city is an industrial city/town, more information is provided on industry but that is not uniformly exhaustive across all industrial cities. Pollution control in the industry sector is largely reported based on the regulatory requirements of stack emissions inspection, challans and closure notices, and issuance of approved fuel list to promote cleaner fuels. This is often incremental and is not adequately framed to capture the massive energy and technology transition needed in the sector.

This reporting varies across cities. For instance, Angul, an industrial town in Odisha, that has topped the chart in Swachh Vayu Survekshan for the relevant

category of cities, has provided more explicit information on action on industrial pollution. This includes information on upgradation of air pollution control equipment as per the need of the new standards and fuel transition; changes being made in the iron and steel industry—desulphurization of coke oven gas, waste heat recovery, use of waste gas for power generation, compliance of industrial DG sets with the prescribed norms, compliance with siting policy prescribed by MoEFCC for waste incinerators, etc.

Similarly, as noted earlier, relatively more detail on industrial pollution control is available for Delhi and NCR – not from the PRANA portal but from the annual report of the MoEFCC or from the CAQM.

Otherwise, the current reporting on industrial pollution largely focuses on inspection and issuing challans. While most cities report on the issue of approved fuel list, there is no information on the extent of fuel change or energy transition following the notification of the approved fuel policy. There is no detail on industry-wise interventions to improve emissions control equipment, processes and fuels in large, medium and small-scale industries, including those in the red and orange categories. There is little information on pollution control in small and medium scale industry and the integration of CEMS monitoring is limited. Fugitive emissions and industrial waste burning are often not part of the reporting.

Usually more information on industry level action is available through other official forums and not necessarily through the PRANA portal. These include clean fuel transition in Delhi, NCR, high adoption of continuous emissions monitoring (CEM) in industries of Uttar Pradesh to assist in complying with emissions limit, enhanced capacity of CEMs in regional offices of Rajasthan, waste heat recovery in West Bengal that can reduce emissions from fuel savings, improvement in brick kiln technologies in some states, common boilers for small-scale units in Gujarat etc.

It is important to note that as a great part of investments in industrial pollution control is expected to be led by the private sector, it is necessary to capture how regulations and enforcement are driving change in industries to upscale and enable investments and implementation for making an impact.

More precise information becomes available when the cities are required to file affidavits in courts. For instance, in its affidavit, Delhi mentions that the Delhi Pollution Control Committee has initiated steps to convert all identified 1,866 industrial units to switch over to PNG. Regular inspections are carried out to

check the use of PNG in the industries identified and 150 more units registered to be converted to PNG. Such granular information from other cities is often not available through the PRANA portal.

In other cities, it is also said that as ULBs are now central to clean air action planning and reporting, the onus of action and reporting largely captures sub-sectors that fall within their jurisdiction. The interdepartmental flow of information on other sectors is sometimes limited.

Need more comprehensive reporting on sector-wise convergence funding

As noted earlier, cities are expected to report progress under the different sectoral line funding that have bearing on air quality. This is called convergence funding. Some selective information that is available from the PRANA portal from November 2021 onwards and from ground-level engagement in a few states indicates the nature of major sector-wise initiatives. This demonstrates how reporting is done separately for NCAP and XV-FC funding as well as convergence funding related to different sectoral schemes and programmes (see *Table 17: Summary list of sector-wise major initiatives reported on PRANA portal*).

This once again brings out that most of NCAP's direct funding is linked with dust mitigation and a lesser amount is spent on waste and vehicles, and nearly none on industry. Such reporting also captures the current spending and programme for waste management, public transport and vehicle electrification, non-motorized transport, etc. that are covered largely by the convergence funding under SBM 2.0, FAME II, AMRUT and smart city programme, among others.

But this also does not adequately capture the full range of progress under convergence funding due to inadequate information flow between departments. There are several cities that have not yet come up to speed to capture sector-wide convergence funding and spending through their reporting systems.

Strengthen indicators not only for quantitative assessment but also for qualitative improvement

This a critical gap in the current system. For instance, Swachh Vayu Survekshan evaluates cities based on action taken and provides quantitative indicators for ranking which is important. But there is no qualitative indicator and target to ensure that planning and execution are in the right direction.

For instance, due to the unprecedented focus on road dust and road building, considerable road building has been undertaken under NCAP. But this road

building can also provide co-benefits if explicitly linked with formally adopted road design for complete street design that addresses walkability, safe cycling and crossings for the pedestrians, adequate space for footpaths, accessible and safe roads for all, multi-functional zones for reorganizing vending and parking, soft paving to reduce heat island effect and improve water percolation, etc. Thus, the spending fails to provide a range of other benefits.

Similarly, this requires CPCB to align the qualitative indicators of planning and reporting more explicitly with a range of central government policies and guidelines that have outlined the scope of service level and design improvement for infrastructure and systems or for new generation policies related to transit-oriented development, multi-modal integration, etc.

For instance, for the planning of public transport deployment and integration in cities, a full range of service-level benchmarks and other requirements have been defined by MoHUA. This is needed to assess the scale and quality of public transport infrastructure that can enable substantial modal shifts in cities.

Likewise, all the indicators need to get mainstreamed into the departmental planning of different sectors for preparation of strategies and budgets to maximize clean air and low carbon gains.

Need city-state-central coordination on policy development to support planning and implementation in each sector

The multi-sector action needed for clean air action is both federal and national in nature.

Local level planning for local pollution sources like solid waste, C&D waste, road dust, urban greens, walking and cycling infrastructure, parking, PUC programme, etc. can be done by city-level planning bodies and regional departments. But industrial pollution control, power plant pollution, high level public transport deployment, etc. will require interventions, and funding support from state and central governments.

For example, all state governments have issued approved fuel lists to replace polluting fuels with cleaner fuels. This requires central government intervention for development and financing of fuel infrastructure as well as fuel pricing policy. This cannot be addressed entirely at the city level. This is evident in the case of industrial natural gas policy. As natural gas is still not included in the GST, the cascading effect of state taxes makes this fuel more expensive than dirtier fuels

and limits the scope of its adoption even if the natural gas pipeline is in place. This makes the investments in the natural gas pipeline infrastructure sub-optimal and inefficient. Therefore, the interface with central policies is critical.

Similarly, in the transport sector, the city clean air action plans in several cities including Mumbai, Delhi and non-attainment cities of Odisha and West Bengal require implementation of remote sensing measurements to advance on-road emissions monitoring and go beyond PUC. There is also a Supreme Court directive to MoRTH to expedite this. But this cannot be taken forward unless MoRTH notifies the rules under Central Motor Vehicle Act and Rules. Even though some cities like Kolkata and Delhi have initiated pilots, its mainstreaming requires a central government notification.

Interface with national policies and policy guidelines is also needed to give direction to planning and designing implementation strategies at the city level. This is needed for defining the scope of indicators for planning in line with specific guidelines instead of taking ad hoc approaches.

Need sustainable funding strategy at the central and state levels

The current funding system under the XV-FC grant will come to an end in 2025–26. It is not known to what extent the central allocation for the NCAP programme is scalable.

At this moment, while the performance-linked grant is a good step forward it is still very nascent and nebulous and needs more time to mature to be really effective. It is stated that framing of a Challenge Fund programme is underway to support priority strategies in key sectors of interventions.
It is now necessary to consider promoting state level innovative financing strategies for sectoral resource mobilization to sustain the action started under NCAP.

The review of micro action plans from several cities shows that along with allocation of NCAP/XV-FC funds for different measures, some cities indicate state schemes that can also support implementation. But usually there is no additional state level strategy to mobilize additional resources through innovative financing. The amount indicated is from the normal budgetary allocation.

In the next phase a more structured approach is needed to mobilize and align resources for clean air action. It has become important to address how public

TOWARDS CHALLENGE FUND FOR ACCELERATING PRIORITY ACTION ACROSS KEY SECTORS

The MoEFCC is proposing to establish the Air Quality Challenge Fund, under the NCAP programme that is to be allocated to cities based on their population and pollution load. The initiative requires cities to commit to mitigating air pollution by fulfilling specific criteria for implementation of prescribed sectoral action.

The criteria will be reform-based challenges. The marks are expected to be apportioned to revise city action plans. For example, waste management strategies will include Construction & Demolition and Plastic Waste Management Rules in city bye-laws; sanctioning of solid waste processing plants for 100 per cent waste generation; installed capacity for processing of solid waste against generation; sanctioning of C&D waste processing plants for 100 per cent generation; and action and disposal of e-waste. This also requires registration of ULB as plastic waste processor under end producer responsibility framework and inclusion of Mission LiFE activities as part of the city action plans.

In addition, Automated Testing Stations (ATS) for vehicles and Registered Vehicle Scrapping Facilities are to be set up. For million plus cities as well as cities with 5 lakh or less than 10 lakh populations, the date for registration of only electric vehicles for public transport (buses/ taxis/ auto-rickshaw) need to be notified. In addition, data filtration from registered vehicle server is needed to terminate old vehicle registration.

There should be regular meetings of district/city-level monitoring and implementation committees; operationalization of an Air Quality Monitoring Cell and a tripartite MoU among CPCB, SPCB/PCC, and the concerned ULB/City for an annual action plan. Participation in Swachh Vayu Survekshan is necessary.

finance can support broader finance flows to support a range of activities for clean and low-carbon action in cities. More structured steps are needed to include year-wise budget forecast for the ongoing and new schemes at least up to 2030 and alignment of the schemes with the short- and long-term targets and associated indicators of the action plan that are also defined by the central and state level policies, regulations and service-level benchmarks. New schemes need to be defined for the full scope of scalable action.

The review of micro action plans from several cities has indicated there is no additional state-level strategy to mobilize additional resources through innovative financing. The amount indicated is from the normal budgetary allocation.

It has become important to address how public finance can support broader finance flows towards increasing the shares of clean and low-carbon actions in cities. This will require more structured steps, including year-wise budget forecast for the ongoing and new schemes at least up to 2030 and aligning these schemes with the

indicators of the action plan. New schemes need to be defined in accordance with the full scope of action outlined in the action plan.

The convergence with central schemes needs to be strengthened with these schemes integrating indicators that will help deliver on clean air objectives. Several cities have started to report separately under NCAP and XV-FC funding and convergence funding. But there are several cities that have not yet come up to speed to capture sector-wide convergence funding and spending through their reporting system.

Targeted subsidy programmes are needed to not only support scaling up of clean technologies, fuels and green infrastructure but also to address affordability and equity. Thus, designing a fiscal strategy will require more innovative approaches, necessitating the mainstreaming of resources and repurposing funding for clean air action.

In the industry sector, more robust market-based mechanisms need to come into play. Well-regulated carbon and emissions trading mechanism for the industry sector can provide significant co-benefits. Thus, designing of fiscal strategy will require more innovative approaches. Carbon trading mechanism for the industry sector can provide significant co-benefits. But this will have to be properly regulated.

This also demands mainstreaming resources and repurposing of funds for clean air action. Repurposing of funding will also be important to redirect resources from inconsequential strategies to more effective ones. For example, significant funding can be reallocated if the spending on road-building is diverted towards creating accessible walking and cycling streets and improving public transport infrastructure.

It is important to point out that in some sectors, policies have already adopted innovative financing mechanisms. For instance, in the transport sector, transit-oriented development linked financing including land value capture is already in place. However, these need to be institutionalized adequately at the state and city levels to be effective.

Applying polluter pay principles through taxes and cess can generate significant revenues for targeted pollution control efforts, as seen in Delhi. This model, replicable in other cities, curbs wasteful resource use and ensures true costs of pollution activities are recovered by enforcing variable parking pricing and eliminating free parking.

As the centre of gravity of action is shifting towards municipalities, it is necessary to explore the potential and opportunity of green bonds. Already, about 11 cities have raised municipal bonds that include Ahmedabad, Surat, Visakhapatnam, Amravati, Indore, Bhopal, Pune, Hyderabad, Lucknow and Vadodara. Ghaziabad, which was among the first to issue green municipal bonds, used the funds to recycle wastewater for drinking water.

As green transition for both clean air and climate change is gaining ground, green finance will become important going forward and can help to mainstream clean air action.

Strategies for green loans to be issued by banks and financing institutions for implementation of green projects or activities that are aligned with a set of defined green criteria will expand. There are expectations that blended finance can be an opportunity to leverage private capital and reduce investment risks. But all of these will require a coherent framework for clean air and climate co-benefits, along with deliberate planning.

It is necessary to ensure that the indicators developed for the clean air action plan get mainstreamed while departments across sectors are preparing strategies and budgets to maximize clean air and low carbon gains.

Go beyond city limits to take a regional approach

During the implementation of NCAP since 2019, it has also become increasingly clear that cities cannot meet their clean air benchmark only with local action but require regional level action to reduce the influence of transboundary pollution. Scientists consider geographical area with common meteorology, topography and climate that affect the dispersion of its unique air mass, to identify airsheds. This requires a regional approach and multi-jurisdictional action. In the next phase, the state clean air action plans will need to get stronger to address this.

For instance, in cities like Delhi, the 2018 TERI-ARAI study has demonstrated how NCR contributes about 23–24 per cent of the Delhi's PM2.5 concentration annually. This can be as high as 70 per cent in winter. Delhi also contributes 28 per cent of annual PM2.5 concentration in Noida, that can increase to 40 per cent in winter.

Technically NCAP has taken this idea of regional airshed based approach on board and has sought inter-state coordination. It has recommended comprehensive regional plans that need to incorporate inputs from regional source apportionment

studies. It has highlighted the measures that can be implemented across multiple jurisdictions. State action plans are an opportunity to address upwind and downwind transboundary air pollution through inter-state and inter-department co-ordination. In fact, following NGT's directive on 9 September 2021, a Joint Committee has investigated developmental and industrial activities in the IGP. Detailed district-wise emission inventory of fine particles (PM2.5) over the IGP has been prepared.

At this stage, the only workable model for such multi-jurisdiction action is in Delhi and NCR that includes four states. Series of directives have been issued for this region under the aegis of the Supreme Court and monitored by EPCA. These include the 2018 Clean Air Action Plan notified for the entire NCR under the Environment Protection Act, 1986, Graded response Action Plan for the NCR in 2016, and expansion of air quality monitoring.

In the industry sector, this led to a phase out of polluting industrial fuels (pet coke, furnace oil) in 2017–18, SOx, NOx national emissions standards for 16 groups of industries and ban on import of pet coke; direction to industries to switch to PNG in NCR; and action on brick kilns. In the transport sector, there has been substantial scaling up of natural gas vehicles and expansion of natural gas pipeline, direction on implementation of parking policy and parking management area plan for demand management in Delhi and NCR, etc.

Post-2019, CAQM has been set up for air quality management of this region. The Act under which the CAQM has been formed recognizes the transboundary nature of air pollution and gives cross-sectoral and cross-jurisdictional authority to the Commission. CAQM is issuing region-wide directives. This has facilitated region-wise action.

The state of Uttar Pradesh has initiated the process of airshed approach. This has brought to the forefront the importance of such sources like solid fuels for cooking, agriculture and heavy-duty vehicles. These were originally not in focus for pollution control. This brings out of the importance of combining city based action with the airshed based air quality management.[17]

This integrated approach for harmonized action across jurisdictions is an important learning that needs to be integrated with the next phase of NCAP.

In the next phase it is necessary to create an inter-state council for coordinated action and also leverage state action plans for state-wide airshed approach for harmonized action across sectors.

SNAPSHOTS OF CITY REPORTS REPORTING ON NCAP, XV-FC AND CONVERGENCE FUNDING SEPARATELY

Here are two examples of how the following cities have identified action funded by different funding sources:

HYDERABAD

Action funded from XV-FC for the FY 2021–22: Rs 118 crore

- End-to-end paving
- Urban greening
- Construction and demolition waste
- Intelligent traffic system
- Synchronization of traffic movement
- Conversion of diesel-operated buses to EV buses
- EV Charging Stations (EVCS) and upstream charging stations

Convergence funding—other funding schemes

- Comprehensive Road Maintenance Programme (CRMP): Regular maintenance of roads, pot hole filling
- Strategic Road Development Plan (SRDP): Major corridors, major roads, flyovers
- Urban forestry: Nurseries, tree samplings, landscape greenery and vertical gardening at flyovers
- Sweeping machines
- Solid waste management: Primary and secondary collection and transportation, processing and disposal facility
- C&D waste management: Waste recycling plant
- EV charging stations: EV stations, green buses
- Waste management: Waste collection and transport: 4,500 Swachh auto tippers, 55 refuse compacter vehicles and 310 vehicles (6 T GVW). 17 transfer stations, 116 static/mobile secondary collection and transfer points, 105 portable self-compactors, 76 static compactor containers and 82 hook-mounted vehicles
- Legacy waste: Scientific landfill, scientific capping of 12 million tonnes of legacy waste; 19.8 MW capacity WtE plant, compost plant, 5 TPD capacity bio-methanation unit, 5 TPD capacity plastic recyclables processing unit, compressed biogas bottling plant, 1 MW solar plant, 600 KLD leachate storage & treatment facility
- C&D waste: 420,274 MT C&D waste collected and 193,686 recycled. 2 C&D waste plants (500 TPD capacity each), 2 more plants are planned
- Water sprinkler: 55 water fountains
- Mechanical sweeping: 35 machines are in operation, total 4 are procured and tender for additional 4, 1,850 kms of roads are covered in 43 routes
- Construction of roads: 216 concrete/bitumen roads covering 92 km, jet patcher machines to maintain pothole-free roads, end-to-end paving (642 km of road completed)
- Greening: 600 nurseries developed, 620.88 lakh tree saplings planted, 406 open spaces developed as parks, 45 locations developed with Miyawaki model of dense plantations, urban forest parks taken up (595 ha), creation of green buffers at 122 locations
- EV: 60 DC fast chargers and 500 AC slow chargers, 167 EV charging stations (plan to expand to 2,500 by 2025); 132 city CNG buses
- ITMs: Adaptive Traffic Control system (ATSC) and pelican signals, synchronization of traffic movement

PUNE

Total fund requirement under XVFC grant (2022–26)

- Total fund requirement: Rs 311.89 crore (2022–26)
- EV component (Rs 250 cr): 80%
- 200 e-buses, 6 e-bus depots, 500 charging points, 400 SWM (EV/CNG), battery swapping stations, EV-based first and last mile connectivity,
- Dust mitigation (Rs 24 crore): 7.69%
- Mechanical sweepers, cycle tracks and footpath construction, air pollution control system for hot mix plants
- Industries and others (Rs 5 crore): 1.6% water fountains for major traffic intersections
- C&D activities (Rs 13 crore): 4.16% C&D waste feeder points, one C&D plant of 250 MT capacity
- Bakeries and crematoria (Rs 9.92 crore): 3.1% air pollution control systems for wood-fired cremations
- Air quality monitoring and strengthening (Rs 9.97 crore): 3.1% urban monitoring, background monitoring stations, meteorological monitoring, ambient air quality modelling, awareness activities, alternative to woodfire/coal for water heating needs in slum areas

Convergence funding—other sectoral funding schemes

- Smart city: E-bus subsidy, environmental sensors, tree plantation, cycle track, ISWM—Rs 65.62 Cr
- FAME II electric mobility: Procurement of 150 e-buses—Rs 16.5 Cr
- Majhi Vasundhara 2.0: Green areas, solar power, rainwater harvesting—Rs 3 Cr
- PMC budget SWM: Mechanized road sweepers, C&D waste processing plant, bio-CNG plant—Rs 47.8 Cr
- PMC and IITM under SAFAR: 10 CAAQMS—Rs 10 Cr
- PMC budget—Green cover and green buffers: Biodiversity park reservations, GIS tree census, road medians maintained, greening, AMRUT van—Rs 13 Cr
- PMC budget—Renewable: Solar panels, tax benefits, solar water heating—Rs 14 Cr
- PMC budget—Crematoriums: APC for wood-fired crematoriums, Venturi type scrubber electric crematoriums—Rs 20.35 Cr
- PMC budget—Mobility: Footpath and cycle track—Rs 80 Cr; Cycle plan—Rs 20 Cr (initiatives include BRT, Pune Cycle Plan; subsidies to 3-wheeler auto rickshaws to convert to CNG, pothole-free roads, wall-to-wall paving and road design improvement, black topping of metalled roads, Pune street programme, urban street design guidelines, and parking and pedestrian policies)

NCAP funding

- Mechanical sweepers, water sprinklers, public awareness & capacity building, cycle track, electric crematoriums, green buffers—Rs 9.45 Cr
- Initiatives under convergence funding
  - » Waste management:
    a. Bio-CNG plant under PMC budget for SWM
    b. Bio-capping of legacy waste at Uruli Devachi and green belt development at waste processing site
    c. C&D waste processing plant (250 MT)
  - » Construction of roads:
    a. Black topping of metalled roads including pavement of road shoulders
    b. Walk smart pedestrian policy
    c. Parking policy developed
  - » Greening: 908 ha of land reserved as biodiversity parks, 210 gardens and projects under Amrut Van
  - » Renewable energy:
    a. More than 58,228 properties have installed solar water heating systems
    b. Implementation of grid-connected rooftop solar PV systems on the roofs of PMC buildings
    c. Installation of ten electric crematorium and 13 air pollution control systems for wood-fired crematoriums

Planning and compliance in small city vs big city

It is also clear that there is difference in scope of action, diversity and complexity of measures, depending on the size of the city. The complex range of solutions including institutional arrangement, infrastructure development, enforcement, compliance framework, etc. that have been planned for mega cities like Delhi, Mumbai, Kolkata, Bengaluru, Hyderabad, etc. are not always directly replicable in smaller cities. The planning must reflect the scale of the urban planning and systems required for big cities to inform target and funding.

The emissions source inventory of the Indo Gangetic Plain states has shown that rural pollution sources can greatly influence the air quality of the region.

With respect to smaller towns, it is clear that the planning will require both local and cluster-based solutions. CSE's review of smaller ULBs across states has shown that the needs of smaller populations require a different approach. A cluster-based approach is required for things like developing infrastructure for waste management and recycling, and public transport strategies. The same facility should be able to cater to the needs of several small towns in a cluster. But the current focus on only one small town in the NCAP list can impede such approaches. Therefore, state clean air action plans need to address that.

However, local enforcement related to waste burning, dust management, use of solid fuels can be common to all smaller towns.

Industrial cities on the other hand require more detailed reporting on compliance monitoring and enforcement strategies for industrial sources. This needs to be detailed out for adequate reporting. The critical challenges are with respect to small- and medium-scale units in non-conforming areas and fugitive emissions associated with dispersed industrial sources.

Strengthen institutional framework for monitoring, capacity building and communication for implementation

Several indicators have highlighted the need for strengthening of departmental capacity for planning, monitoring, tracking and providing laboratory support for air quality monitoring and assessment. This requires well-aligned institutional systems for programme monitoring and reporting. Each city has a high-level task force that is in many cases under the chairpersonship of the chief secretary of the states with representation of the departmental heads. This needs to work more efficiently.

Further, each municipal corporation is mandated to set up an air pollution cell for programme monitoring and coordination. This cell should have representation from each sector with well-defined mandate and responsibility. This cell needs to be adequately empowered for inter-departmental coordination. This also requires supportive technical advisory for knowledge support for target setting and monitoring of action with requisite benchmarks in each sector.

The plans have also outlined the need for training and skill development of public officials. It has also asked for creating systems and infrastructure for communication, public outreach, public grievance cell, etc. This may be planned adequately. This will have to be supported by a regular programme on training and skill development of public officials. It is important to create and design modules of training for more targeted orientation programmes to build capacity across all departments. This requires deeper understanding of detailed standard operating procedure (SOP) and management information system (MIS) within each department—preferably well automated, to ensure proper implementation and reporting.

Need protocol for data recording and reporting based on the indicators for reporting progress

Reviews in cities show the struggle that ULBs and SPCBs face in collating information from all departments and then uploading that on the PRANA portal. Sometimes it is evident that the concerned departments have requisite data/information on several indicators. But it is often not understood how to track and maintain datasets for reporting purposes. This leads to ambiguity in reporting. This may also lead to under reporting of action. It is advisable that for departmental and inter-departmental sourcing of information, a designated team of officials is put in place in each city who will be trained to track data and information according to the CPCB indicators and develop data recording systems. Even though the departments have nodal officials, lack of protocol for inter-departmental coordination makes the system sub-optimal.

As far as possible, the departments and ULBs should be supported and enabled for automated systems of e-recording of data based on well-defined protocol that is easily accessible according to pre-defined format of reporting. Capacity building is needed for this purpose.

While some set of data/information exists with the departments as part of the regular planning and implementation, more focused information generation is also needed. This may require surveys or ground-level assessments as part of

the programme design and implementation. This may also require third party engagement for project planning and implementation.

Information generated as part of the tendering or feasibility studies in different sectors will have to be leveraged for creating centralized databases. Departmental and inter-departmental flow of information (both quantitative and qualitative) for regular reporting will eventually require an automated dashboard at the city level. Such detailed information generation is possible if departments adopt protocol for data generation, recording and reporting based on the CPCB indicators and accordingly redefine the scope of action/programme/schemes in each city. This needs to be linked with the decision-making process within the departments and the investments in ITS.

Departments often find it challenging to provide granular data sought for each indicator. This can create problems going forward if the concerned schemes and programmes are not adequately tracked according to the requirements. This detailing will require supportive action in terms of enforcement strategy, regulation development, infrastructure creation, and human resource development to set targets with clear milestones.

Otherwise, the progress report over time will have very little to fall back on and in most cases, it will be challenging to provide updated information to demonstrate progress. This reporting requirement is therefore directly related to strategy development in each sector. This is also needed for target setting that the new reporting mechanism requires. This makes guidance framework and guidelines for strategy development and further refinement of action or initiation of new measures in each sector necessary.

It is necessary to create combined mandate and databases when multiple agencies are involved in planning and execution of programmes. Within the municipal limits, several departments can be involved with the provisioning of infrastructure like roads, electricity and electric vehicle charging infrastructure, bus transport infrastructure and buses, etc. Several departments may also have common enforcement areas.

For instance, it has been noted that multiple land-owning agencies often have disaggregated mandates and databases. Aligning their roles and respective information systems for integrated tracking, monitoring and reporting is necessary. This can be a one-time exercise that can be periodically updated. For instance, road

infrastructure may be provided by several departments—PWD, municipalities, and development authorities—within the same municipal jurisdiction, but all are responsible for implementing common and upgraded road design guidelines for carriageway, pedestrian and cycling infrastructure, greenery and innovative drainage, etc.

Similarly, on several indicators, while ULBs or the Transport Department might be responsible for planning and to some extent enforcement, the Traffic Police may also have a role in the enforcement of the same indicators. Therefore, all the departments will have to be adequately informed and aligned.

This is particularly relevant for enforcement strategies. Several CPCB indicators require data reporting on enforcement and penal action in different sectors. It is evident from ground-level assessment that the function of enforcement is often disconnected from the planning body or enforcement is shared between departments like the municipal corporations and traffic police depending on the jurisdiction of the departments or definition of the business rules.

For example, in some cities, while municipalities and SPCBs enforce rules related to C&D inside the construction premises of the buildings, the traffic police enforce rules outside the buildings in public areas. Therefore, while defining enforcement rules, it is important to establish responsibilities of the concerned departments for each indicator for aligned action and reporting.

Prioritize action in key sectors to implement at a scale across the regions

The Challenge Fund that is under discussion needs to identify priority action across key sectors of pollution and develop a funding and a compliance framework for their implementation in cities and at a regional scale. The next phase of funding has to ensure massive clean energy transition in industry; massive cleaning up of vehicle fleet by phasing out targeted end-of-life vehicles, especially heavy duty vehicles; electrification of vehicles at a scale for zero emissions transition; scale up integrated public transport; eliminate solid fuels for cooking; and achieve circularity by fully implementing the targets of 100 per cent collection and segregation of waste, material recovery, remediation of legacy waste in dumpsites and diversion of fresh waste from dump sites. Linking funding with sectoral priority action and progress in their implementation is necessary to make a difference to air quality.

Performance-linked assessment needs to capture emerging good practices in cities

Ranking of cities and scoring for performance-linked funding need to capture emerging good practices to facilitate learning for all cities. It would be wasteful if the annual exercise of performance assessment of cities to identify the best performing cities is not effectively utilized to capture the details of the emerging good practices in different sectors.

This is an opportunity for all other cities to understand the level of maturity required for sectoral action to meet both quantitative and qualitative targets.

Despite the challenges, a substantial number of sectoral good practices are emerging across cities that provide crucial lessons on the direction and scale of change needed to improve air quality significantly. The annual ranking of cities should provide details for cross learning among cities and regions.

Annexures

Annexure 1: The criteria for scoring and ranking of NCAP and XV-FC cities, 2020–21 to 2022–23

<table>
<tr><th></th><th>NCAP cities assessment</th><th>XV-FC cities assessment</th></tr>
<tr><td colspan="3">Assessment 1: FY 2020–21 (FY 1 April 2020 to 31 August 2021, extended due to COVID)</td></tr>
<tr><td>Rationale for evaluation/ parameters considered</td><td>Parameter A, B, C (3 parameters) considered for city evaluation:
1. Parameter A: Strengthening of the pollution monitoring mechanism
2. Parameter B: Source-wise cause analysis for air pollution
3. Parameter C: Progress on action plan and compliance of statutory guidelines/rules</td><td>Parameter A, B, C and D (4 parameters) considered for city evaluation:
1. Parameter A: Strengthening of the pollution monitoring mechanism
2. Parameter B: Source-wise cause analysis for air pollution
3. Parameter C: Progress on action plan and compliance of statutory guidelines/rules
4. Parameter D: Quantification and evaluation of air quality improvement, including,
i. Reduction in particulate matter (PM10)
ii. Frequency of exceedance in AQI levels</td></tr>
<tr><td>Criteria for assigning scores</td><td>The criteria for assigning scores to the cities are based on following activities:<table><tr><th>Activities</th><th>Score</th></tr><tr><td>Preparation of City Micro Action Plan as per CPCB-specified modal format</td><td>40</td></tr><tr><td>Performance assessment based on Parameters A, B and C
Parameter A: 20 marks
Parameter B: 20 marks
Parameter B: 20 marks</td><td>60</td></tr><tr><td>Total</td><td>100</td></tr></table></td><td>The criteria for assigning score to the cities are based on following activities:<table><tr><th>Activities</th><th>Score</th></tr><tr><td>Parameter A: Strengthening of the pollution monitoring mechanism</td><td>10</td></tr><tr><td>Parameter B: Source-wise cause analysis for air pollution</td><td>10</td></tr><tr><td>Parameter C: Progress on action plan and compliance of statutory guidelines/rules</td><td>10</td></tr><tr><td>Parameter D: Quantification and evaluation of air quality improvement</td><td>70</td></tr><tr><td>Total</td><td>100</td></tr></table></td></tr>
<tr><td>Scoring principle</td><td>▪ The assessment for scoring of cities was done for the period (FY 1 April to 31 March, 2019–20) of the preceding financial year.
▪ During the first year of assessment, 40 per cent weightage was given to the preparation of CAPs and 60 per cent to the 3 parameters (Parameter A, B, and C), and parameter D was excluded due to PM10 and AQI not being taken into consideration.</td><td>▪ XV-Cities have been assessed for the preceding year data of FY 2019-20 for 2020-21.
▪ 30 per cent weightage given to Parameters A, B and C and 70 per cent weightage to Parameter D.</td></tr>
<tr><td colspan="3">Assessment 2: 2021–22 (FY 1 April 2021 to 31 March 2022)</td></tr>
<tr><td>Rationale for evaluation/ parameters considered</td><td>▪ Cities have been assessed based on the fourth Parameter (Parameter D: Quantification and evaluation of air quality improvement).
▪ Only one parameter has been taken into consideration (Parameter D).</td><td>▪ Cities have been evaluated based on the fourth Parameter (Parameter D: Quantification and evaluation of air quality improvement).
▪ Only one parameter has been taken into consideration (Parameter D).</td></tr>
<tr><td>Criteria for assigning scores</td><td>Reduction in annual average PM10 concentration (40 per cent or more than 40 per cent) from base year to current year, 2019–20 to 2021–22</td><td>1. Reduction in annual average PM10 concentration
2. Increase in good days (AQI < 200)
3. Annual average PM10 concentration and AQI days for FY 2021–22 is compared with data of previous year i.e. FY 2020–21.</td></tr>
</table>

<table>
<tr>
<td>Performance factor</td>
<td>

The performance of the cities has been assessed using the performance factor.
The performance factor has been calculated to compare the actual reduction in PM10 concentration to the targeted reduction during the assessment year.

Performance factor = 100 x R(A)/R(T)

Where Performance Factor (on total score of 100) = P
Actual reduction in PM10 for the assessment year = R(A)
Targeted reduction (prescribed by CPCB) of PM10 for the assessment year = R (T)

For instance,
In 2019–20, the PM10 level in Nellore city was 67 µg/m^3, which reduced to 55 µg/m^3 in 2021–22. It has reduced by 12µg/m^3 against the city targets of 3 µg/m^3. So, the performance factor of the city was 400.
Performance factor (Nellore city) = 100 x 12/3 = 400
<table>
<tr><th colspan="3">Performance factor: NCAP cities</th></tr>
<tr><th>Scoring basis</th><th>Score assigned to city</th><th>Fund allocation</th></tr>
<tr><td>Higher PM10 reductions against the given target</td><td>Above 100</td><td>Eligible for performance-based incentives</td></tr>
<tr><td>PM10 reduction as per the given target</td><td>100</td><td>Eligible for performance-based allocation</td></tr>
<tr><td>No reduction in PM10 or negative reduction</td><td>0</td><td>No grant</td></tr>
</table>
</td>
<td>
The performance factor has been computed based on the reduction in annual average PM10 concentration and increase in good days (AQI < 200).
Table A: Reduction (%) in annual average PM10 concentration
<table>
<tr><th>Sr. no.</th><th>Reduction (%) in annual average PM10 concentration</th><th>Improvement</th></tr>
<tr><td>1</td><td>15 and above</td><td>High</td></tr>
<tr><td>2</td><td><15</td><td>Low</td></tr>
</table>
Table B: increase in good days, AQI
<table>
<tr><th>S.No</th><th>Increase in Good days (%) AQI</th><th>Improvement</th></tr>
<tr><td>1</td><td>15 and above</td><td>High</td></tr>
<tr><td>2</td><td><15</td><td>Low</td></tr>
</table>
Overall Performance Factor (Table A & B) as per following matrix-
<table>
<tr><th>Sr. no.</th><th>Reduction (%) in annual average concentration (from Table A)</th><th>Increase in good days (%) (from Table B)</th><th>Performance Factor, SD= Score, S*</th></tr>
<tr><td>1</td><td>High</td><td>High</td><td>100</td></tr>
<tr><td>2</td><td>Low</td><td>High</td><td>75</td></tr>
<tr><td>3</td><td>High</td><td>Low</td><td>50</td></tr>
<tr><td>4</td><td>Low</td><td>Low</td><td>25</td></tr>
</table>
</td>
</tr>
<tr>
<td>Data consideration</td>
<td>

The manual monitoring data from the National Air Quality Monitoring Programme (NAMP) is used to evaluate the performance of cities.
The annual data has been considered from 1 April to 31 March.

</td>
<td>

Integrated the daily average data of manual as well as continuous monitoring stations.
98 percentile value (2% outliers of 365 days) has been considered to represent the base characteristics of air quality of a city and any reduction in such value defines improvement.
Outlier's removal: First, average value of PM10 concentration of considered quarters' data along with standard deviation value (₹) is calculated. After that, average value is subtracted from each value of PM10, if its resultant value falls outside of ±2 ₹, then that value of PM10 is not considered.
Average annual PM10 concentration is calculated after removal of outliers for both years for comparison between values of two years.
Data unavailable for a few days were computed using linear interpolation method.
Number of days having the PM10 concentration ≤250 µg/m^3
(AQI<200) are considered as Good days as per DoE Guideline.

</td>
</tr>
</table>

<table>
<tr><td>Basis of ranking the cities</td><td>Cities that reduced PM10 levels as per the recommended target, receiving scores of 100 and above, ranked as the best performers. Cities with no improvements as per the given target, ranked as the worst performers, receiving scores of less than 40.</td><td>The cities that demonstrated higher reductions in PM10 concentration (15% and above) and greater improvements in good days (15% and above) obtained scores of 100, while cities that demonstrated lower improvement in PM10 concentration and good days received scores of 25.</td></tr>
<tr><td>Cities ranking as per CPCB evaluation, 2021–22</td><td>Scoring of NCAP cities based on performance assessment, FY 2021–22
<table>
<tr><th>Performance score</th><th>No. of cities</th><th>Cities</th></tr>
<tr><td>>100</td><td>37</td><td>Srinagar, Gorakhpur, Moradabad, Firozabad, Bareilly, Dehradun, Guwahati, Cuttack, Bhubneshwar, Kolhapur, Amravati, Solapur, Hubli-Dharwad, Sangli, Nellore, Khurja*, Raebareli, Rishikesh, Alwar, Dewas, Balasore, Thoothukuddi*, Dimapur, Latur, Akola, Davanagere, Ongole, Anantapur, Chittoor, Gajraula*, Anpara, Gobindgarh, Nalagarh*, Talcher, Naya Nangal, Kohima, Sunder Nagar</td></tr>
<tr><td>>80-100</td><td>6</td><td>Parwanoo, Sibsagar, Pathankot/ Dera Baba*, Udaipur, Sangareddy, Gulburga</td></tr>
<tr><td>>60-80</td><td>2</td><td>Noida, Kashipur</td></tr>
<tr><td>>40-50</td><td>3</td><td>Rourkela, Jalna, Baddi</td></tr>
<tr><td>Below 40</td><td>34</td><td>Delhi, Chandigarh, Jammu, Durgapur, Jalandhar, Jhansi, Ujjain, Guntur, Muzzafarpur*, khanna, Patiala, Chandrapur, Nagaon*, Gaya, Sagar, Haldia, Vizianagaram, Srikakulam, Eluru, Nalgonda*, Rajahmundry, Jalgaon, Kurnool, Korba*, Kadapa, Silchar*, Kalinga Nagar, Dera Bassi, Brynihat, Angul, Paonta Sahib, Nalbari, Damtal, Kala Amb*</td></tr>
<tr><td>Total</td><td>82</td><td></td></tr>
</table>
Source: 5th meeting of Steering Committee on NCAP, 5th August 2022

43 cities have been scored more than 100 marks
2 cities have been scored between 60–80 marks
3 cities scored between 40–50 marks
34 cities scored below 40 marks
</td><td>Scoring of XV-FC cities based on performance assessment, FY 2021–22
<table>
<tr><th>Performance Score</th><th>No. of cities</th><th>Cities</th></tr>
<tr><td>100</td><td>3</td><td>Allahabad, Lucknow and Varanasi</td></tr>
<tr><td>75</td><td>33</td><td>Jaipur, Kota, Vijayawada, Visakhapatnam, Durg Bhilainagar, Raipur, Ahmedabad, Rajkot, Surat, Vadodara, Jamshedpur, Ranchi, Bengaluru, Bhopal, Gwalior, Indore, Jabalpur, Aurangabad, Mumbai, Nagpur, Nashik, Pune, Vasai virar, Amritsar, Ludhiana, Chennai, Madurai, Trichy, Hyderabad, Agra, Meerut, Asansol, Kolkata</td></tr>
<tr><td>25</td><td>6</td><td>Ghaziabad, Kanpur, Jodhpur, Dhanbad, Faridabad and Patna</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>42</td><td></td></tr>
</table>
Source: 5th meeting of Steering Committee on NCAP, 5th August 2022

Varanasi, Lucknow and Allahabad were among the best performing cities that obtained scores of 100
Ghaziabad, Kanpur, Jodhpur, Dhanbad, Faridabad, and Patna were among the worst performing cities to obtain scores of 25,
The remaining 33 average performing cities obtained a score of 75.
</td></tr>
<tr><td colspan="3">Assessment of cities, FY 2022–23 (FY 1 April 2022 to 31 March 2023)
The performance of cities in 2023 was evaluated using the same methodology as in 2022. Only the ranking of cities has been changed in the 2023 assessment.</td></tr>
<tr><td colspan="2">Scoring of NCAP cities based on performance assessment, FY 2022–23

18 cities scored more than 100 marks (performance factor)
7 cities scored more than 80 marks: Nalbari, Jalandhar, Parwanoo, Sibsagar, Latur, Khanna and Dehradun
1 city scored between 50–60 marks: Naya Nangal
1 city scored between 40–50 marks: Rajahmundry
53 cities scored below 40 marks: Delhi, Chandigarh, Noida, Rourkela, Cuttack, Bhubaneswar, Udaipur, Angul, etc.
</td><td>Scoring of XV-FC cities based on performance assessment, FY 2022–23

4 cities obtained a score of 100: Ahmedabad, Rajkot, Varanasi and Dhanbad
2 cities obtained score of 50: Agra and Kanpur
10 cities obtained score of 25: Asansol, Gwalior, Faridabad, Lucknow, Meerut, Ghaziabad, Kanpur, Jodhpur, Patna and Vasai-Virar
Remaining 26 cities obtained score of 75

Source: MoM_13th_IC.pdf (cpcb.gov.in)</td></tr>
</table>

Source: Compiled from various sources, PRANA Portal

Annexure 2: Parameters to assess city performance (for release of funds) for NCAP and XV-FC cities, FY 2021–22

<table>
<tr><td>Parameter A</td><td>Strengthening of the pollution monitoring mechanism
a. Operationalization of Air quality Monitoring (AQM) Cell
b. IT-enabled air quality data management system
c. Coordination Committee reviews including progress and review of city action plans, including public grievance redresser portal, emergency response and awareness programme.</td></tr>
<tr><td>Parameter B</td><td>Source-wise cause analysis for air pollution
a. Identification of hotspots within and outside ULB
b. Air quality profiling to identify suitable locations for air quality
c. Assessment of sources of pollution in the city or source apportionment study
d. Engagement of technical institutes as knowledge partners</td></tr>
<tr><td>Parameter C</td><td>Progress on action plan and compliance of statutory guidelines/rules
a. Implementation and updation of city action plans
b. Monitoring of PUC vehicles
c. Infrastructure planning and set up of CAAQMS or Manual AQMS</td></tr>
<tr><td>Parameter D</td><td>Quantification and evaluation of air quality improvement with the weightage
For assessment of XV-FC cities, two factors have been considered:

i. Reduction in air pollution levels (Particulate matter)
a. Based on international practice, 98 percentile value (2% outliers of 365 days) has been considered to represent the base characteristics of air quality of a city and any reduction in such value defines improvement.
b. For air quality management and assessment purpose the annual data is considered from April to March, AQI Calendar Year
c. Percentage reduction observed in 98 percentile value of maximum PM10 concentration observed on all normal days* of the year from the baseline data of 42 MPC/UAs (see Annexure 1) is graded as following:

<table>
<tr><th>Sr. no.</th><th>Reduction (%) in annual average PM10 concentration</th><th>Improvement</th></tr>
<tr><td>1</td><td>15 and above</td><td>High</td></tr>
<tr><td>2</td><td><15</td><td>Low</td></tr>
</table>
ii. Frequency of exceedance in AQI levels
a. The number of days exceeding AQI (Moderate: 200**) out of total number of normal days monitored per day is graded as under:
<table>
<tr><th>Sr. no.</th><th>Increase in Good days (%) AQI</th><th>Improvement</th></tr>
<tr><td>1</td><td>15 and above</td><td>High</td></tr>
<tr><td>2</td><td><15</td><td>Low</td></tr>
</table>
Overall Performance factor method to evaluate XV-FC cities:
<table>
<tr><th>Sr. no.</th><th>Reduction (%) in annual average PM10 concentration</th><th>Increase in good days (%)</th><th>Performance Factor, SD = Score, S*</th><th>Percent of fund based on performance score</th></tr>
<tr><td>1</td><td>High</td><td>High</td><td>100</td><td>100</td></tr>
<tr><td>2</td><td>Low</td><td>High</td><td>75</td><td>75</td></tr>
<tr><td>3</td><td>High</td><td>Low</td><td>50</td><td>50</td></tr>
<tr><td>4</td><td>Low</td><td>Low</td><td>25</td><td>0</td></tr>
</table>
For assessment of NCAP cities, only Parameters A, B and C has been considered in FY 2021–22 (see Annexure 3). From 2022–23, annual average reduction in PM10 concentration has been considered as a fourth parameter (Parameter D) to assess city performance.</td></tr>
</table>

Source: Amendment in guidelines for the release and utilization of funds under National Clean Air Program (NCAP), MoEFCC, 25 August 2022

**Normal days to be defined by each city in consultation with meteorological department based on statistical analysis of critical Meteorological parameters for each season.*

*** MoEFCC may work out the AQI levels annually after suitably adjusting the all-India average*

Annexure 3: Framework for city performance assessment for fund release, 2021–22 to 2022–23

<table>
<tr><th></th><th>First instalment, 2021–22</th><th>Second instalment, 2021–22</th></tr>
<tr><td>Necessary condition/ minimum eligibility criteria for fund</td><td>a. Submission of Utilization Certificates (UCs) of minimum 60% of sum total of funds released in preceding year (2020–21)

b. Funds carry forwarded from FY 2019–20.</td><td>a. Submission of Utilization Certificates (UCs) of minimum 60% available funds

b. Unspent balance on 1 April of the FY plus the amount of funds released as first instalment in the Financial Year</td></tr>
<tr><td>Annual allocation fund</td><td>60% of the city's annual allocation has been given based on the ratio of population and PM10 concentration (Fund allocation ratio prescribed by MoEFCC, 2019–20)
(Second instalment will be released based on the performance)</td><td>40% of the annual allocation of the city was determined based on score assigned to the city, based on the performance.

For instance, if a city scores 70, it will be given 75 per cent of the second instalment amount.</td></tr>
<tr><td></td><td></td><td>Rationale for performance-based funding from 2021 onwards (FY 2021–22): Rationale for assigning score to the cities for determining annual allocation released as a second installment</td></tr>
<tr><td></td><td></td><td>NCAP cities performance assessment, 2021–22:

Relative weightage to assess the performance of NCAP cities (for second instalment) was based on two activities:
1. Preparation of City Action Plans (CAPs) and
2. Consideration of parameters A, B and C.

<table>
<tr><th>Sr.no.</th><th>Activities</th><th>Score</th></tr>
<tr><td>1.</td><td>Preparation of City Micro Action Plan as per CPCB specified model format.</td><td>40</td></tr>
<tr><td>2.</td><td>Assessment of performance in respect of parameter A, B and C.
Allocation of marks:
Parameter A: Strengthening of the pollution monitoring mechanism (20 marks)
Parameter B: Source-wise cause analysis for air pollution (20 marks)
Parameter C: Progress on action plan and compliance of statutory guidelines/rules (20 marks)</td><td>60</td></tr>
</table>

Parameter D excluded (Quantification and evaluation of air quality improvement with the weightage) because the funds have been utilized by the cities (during 2019–20 to 2021–22) for City Action Plans (CAPs) to achieve the desired objective of the clean air.

XV-FC cities assessment, 2021–22:
In FY 2021–22, the relative weightage for assessment of city performance on air quality was based on the 4 parameters under XV-FC for release of funds.</td></tr>
</table>

<table>
<tr><th></th><th>First instalment, 2021–22</th><th>Second instalment, 2021–22</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Parameter 2021</th><th>Score</th></tr>
<tr><td colspan="2">Process and input-based criteria:</td></tr>
<tr><td>Parameter A: Strengthening of the pollution monitoring mechanism</td><td>10</td></tr>
<tr><td>Parameter B: Source-wise cause analysis for air pollution</td><td>10</td></tr>
<tr><td>Parameter C: Progress on action plan and compliance of statutory guidelines/rules</td><td>10</td></tr>
<tr><td>Parameter D: Quantification and evaluation of air quality improvement with the weightage
▪ Reduction in Air pollution level (PM10)
▪ Frequency of Excellence in AQI levels
(After 2021–22 entire weightage will be on D Parameter)</td><td>70</td></tr>
<tr><td>Total</td><td>100</td></tr>
</table>
Performance-based grant: Based on the assigned score to the city as per Parameters A, B, C & D, performance grant has been allocated to the 131 NACs.
<table>
<tr><th>Score of city</th><th>Percent of fund allocation from 2021–22 onwards</th></tr>
<tr><td>80-100</td><td>100</td></tr>
<tr><td>60-80</td><td>75</td></tr>
<tr><td>50-60</td><td>50</td></tr>
<tr><td>40-50</td><td>25</td></tr>
<tr><td>Below 40</td><td>Nil</td></tr>
</table>
</td></tr>
<tr><th></th><th>First instalment, 2022–23</th><th>Second instalment, 2022–23</th></tr>
<tr><td>Necessary condition/ minimum eligibility criteria for fund</td><td>a. Submission of 75% of the pending Utilization Certificates (UCs) as on 1 April of FY 2022

b. Deposition of accrued interest on unsent balance as on 1 April of financial year.</td><td>Submission of remaining (25%) Utilization Certificates (UCs) pending as on 1 April of Financial Year (i.e. 1 April 2022)</td></tr>
<tr><td rowspan="2">Annual allocation fund (release of funds)</td><td>90% of the actual annual allocation of fund to the city for the financial year.
a. 60% of annual allocation based on the on the ratio of population and PM10 concentration
b. Performance-based allocation out of 40% of the annual allocation of the city determined on the basis of score assigned to the city
c. Performance-based incentives for the city calculated based on the performance factor</td><td>10% of the actual annual allocation of fund to the city for the financial year.</td></tr>
<tr><td>Rationale for performance-based funding from 2022 onwards (FY 2022–23): Rationale for assigning score to the cities for determining performance bases allocation and incentives</td><td></td></tr>
</table>

<table>
<tr><th></th><th>First instalment, 2021–22</th><th>Second instalment, 2021–22</th></tr>
<tr><td>Performance factor calculation for city evaluation</td><td>
NCAP cities assessment, 2022 onwards:

From FY 2022–23, 100 per cent weightage has been given to Parameter D: Quantification of improvement in air quality (PM10 reductions) for performance assessment of cities
Performance factor (P) has been computed to compare the actual reduction in PM10 concentration to the targeted reduction during the assessment year.
The cities that achieved higher PM10 reductions against targets got a score above 100.

<table>
<tr><th colspan="3">Performance factor: NCAP cities</th></tr>
<tr><th>Scoring basis</th><th>Score assigned to city</th><th>Fund allocation</th></tr>
<tr><td>Higher PM10 reductions against the given target</td><td>Above 100</td><td>Eligible for performance-based incentives</td></tr>
<tr><td>PM10 reduction as per the given target</td><td>100</td><td>Eligible for performance-based allocation</td></tr>
<tr><td>No reduction in PM10 or negative reduction</td><td>0</td><td>No grant</td></tr>
</table>
Performance factor = 100 x R(A)/R(T)

Where Performance Factor (On total score of 100) = P
Actual reduction in PM10 for the Assessment year = R(A)
Targeted reduction (prescribed by CPCB) of PM10 for the assessment year = R(T)

XV-FC cities assessment, 2022 onwards:

Weightage has been given based on the Parameter D: Quantification of improvement in air quality (PM10 reduction and increase in good days, AQI)
Performance factor has been calculated based on the reduction in PM10 concentrations and increase in the good days (AQI) from the base year 2019–20 for performance-based grants.

Overall Performance factor method to evaluate XV-FC cities:
<table>
<tr><th>Sr. no.</th><th>Reduction (%) in annual average PM10 concentration</th><th>Increase in good days (%)</th><th>Performance Factor, SD = Score, S*</th><th>Percent of fund based on performance score</th></tr>
<tr><td>1</td><td>High</td><td>High</td><td>100</td><td>100</td></tr>
<tr><td>2</td><td>Low</td><td>High</td><td>75</td><td>75</td></tr>
<tr><td>3</td><td>High</td><td>Low</td><td>50</td><td>50</td></tr>
<tr><td>4</td><td>Low</td><td>Low</td><td>25</td><td>0</td></tr>
</table>
</td><td></td></tr>
</table>

	First instalment, 2021–22	Second instalment, 2021–22
	Performance-based incentives The composite performance factor can be more than 100 in cases where performance factor of city exceeds the targets. Cities with scores higher than 100 have been considered for incentive grant from undistributed grant. The leftover funds will be distributed to cities having scores above 100 in proportion of their score in excess of 100 multiplied by their percentage allocation (fund allocation ratio). The additional allocation will not be more than their annual allocation. For instance, In 2019–20, the PM10 levels in Nellore city was 67µg/m^3 which reduced to 55 µg/m^3 in 2021–22. It has reduced by 12 µg/m^3 against the city targets of 3 µg/m^3. So, the performance factor of the city was 400. Performance factor (Nellore city) = 100x12/3 = 400 Therefore, Nellore city has received the incentives based on the performance.	
Release of funds, FY 2023-24		
Under NCAP and XV-FC, funds for 2023–24 will only be released upon submission of 75 per cent Utilization Certificates (UC) for the funds released during FY 2022–23 and 100 per cent utilization up to 2021–22. In 2023–24, there were 27 NCAP cities that received the incentive grants based on their performance in FY 2022–23.		

Source: Compiled from various sources, PRANA Portal

1. Operational guidelines for implementation of the recommendations on Urban Local Body grants (Ambient Air Quality Component) contained in Chapter 7 of the Fifteenth Finance Commission (FC-XV) Final report, 10 August 2021, Ministry of Finance, Government of India
2. Amendment in guidelines for the release and utilization of funds under National Clean Air Program (NCAP), 25 August 2022, MoEFCC, Government of India

Annexure 4: Performance evaluation framework for release of funds for FY 2022–23 to 2025–26

A	Necessary condition/ eligibility	Funds released as first instalment/actual annual allocation
First instalment	a. Submission of 75% of the pending Utilization Certificates (UCs) as on 1 April of FY 2022 b. Deposition of accrued interest on unsent balance as on 1 April of financial year.	90% of the **actual annual allocation of fund** to the city for the financial year. Actual annual allocation of fund to the city will include the following: **a.** 60% of annual allocation of the city in the FY 2022–23 **b.** Performance-based allocation out of remaining 40% of the annual allocation of the city determined on the basis of score assigned to the city **c.** Performance-based incentives for the city calculated based on the performance factor.
B	**Necessary condition/ eligibility**	**Funds released as second instalment/actual annual allocation**
Second instalment	Submission of remaining (25%) Utilization Certificates (UCs) pending as on 1 April of Financial Year (i.e., 1 April 2022)	10% of the actual annual allocation of fund to the city for the financial year.

Source: Amendment in guidelines for the release and utilization of funds under National Clean Air Program (NCAP), 25 August 2022, MoEFCC, Government of India

Annexure 5: Relative weightage to assess the performance of XV-FC cities

Parameter 2021	2021–22	2022–23	2023–24	2024–25	2025–26
Parameter A: Strengthening of the pollution monitoring mechanism	10	-	-	-	-
Parameter B: Source-wise cause analysis for air pollution	10	-	-	-	-
Parameter C: Progress on action plan and compliance of statutory guidelines/rules	10	-	-	-	-
Parameter D: Quantification and evaluation of air quality improvement with the weightage	70	100	100	100	100
Total	**100**	**100**	**100**	**100**	**100**

Source: Operational guidelines for implementation of the recommendations on Urban Local Body grants (Ambient Air Quality Component) contained in Chapter 7 of the Fifteenth Finance Commission (FC-XV) Final report, 10 August 2021, Ministry of Finance, Government of India

Annexure 6: Differing results—Comparison of rank of 131 cities under Swachh Vayu Sarvekshan, NCAP and XV-FC assessments, FY 2022–23

(For the purpose of comparison all cities classified based on population—More than 10 lakh, 3–10 lakh and less than 3 lakh)

Category I: Population above 10 lakh (No. of cities: 47)

Population wise category	Swachh Vayu Survekshan, FY 2022–23		82 NCAP cities, FY 2022–23		42 XV-FC cities, FY 2022–23	
	Rank/ Score achieved (out of 200)	City/Town	Score achieved (from 0 to >100)	City/Town	Score achieved (out of 100)	City/Town
Category-I: Population above 10 lakhs (47 cities)	Rank 1 to 6 (score >180)	**Indore** (Rank 1, score 187), **Agra** (Rank 2, score-186), Thane (Rank 3, score-185.2), **Srinagar** (Rank 4, score-184.6), **Bhopal** (Rank 5, score-181), **Trichy** (Rank 6, score-180.5)	Above 100	**Srinagar (214)**	Above 75-100	**Varanasi (100), Ahmedabad (100), Rajkot (100), Dhanbad (100)**
	Rank 7 to 21 (score >160-180)	**Vadodara** (Rank 7, score-180), **Ahmedabad** (Rank 8, score-178), **Delhi** (Rank 9, score-177), **Mumbai** (Rank 10, score-176.3), **Varanasi** (Rank 11, score-173), **Ghaziabad, Jabalpur** (Rank 12, score-172), Surat (Rank 13, score- 170.5), Hyderabad (Rank 14, score-170.1), **Meerut, Rajkot** (Rank 15, score-170), Raipur (Rank 16, score-169.5), Vijayawada (Rank 17, score-168.5), Nagpur (Rank 18, score-166), **Dhanbad** (Rank 19, score-164.1), Vishakhapatnam (Rank 20, score-163), Nashik (Rank 21, score-160.3)	>80-100	–	>50-75	**Indore (75)**, **Bhopal (75)**, **Trichy (75)**, **Vadodara (75), Mumbai (75),** Bangalore (75), Jabalpur (75), Surat (75), Hyderabad (75), Raipur (75), Vijayawada (75), Nagpur (75), Nashik (75), Allahabad (75), Pune (75), Durg Bhilai (75), Jaipur (75), Kolkata (75), ***Amritsar (75), Chennai (75), Ranchi (75), Kota (75), Aurangabad (75), Jamshedpur (75), Madurai (75)***, Vishakhapatnam (75)
	Rank 22 to 35 (score >130-160)	**Chandigarh** (Rank 22, score-158), Kanpur (Rank 23, score-156), **Lucknow** (Rank 24, score-155.7), Bangalore (Rank 25, score-154.7), **Ludhiana** (Rank-26, score-154.5), **Patna** (Rank 27, score-154), Allahabad (Rank 28, score-150), Pune (Rank 29, score-144.2), Durg Bhilai (Rank 30, score-141.9), Jaipur (Rank 31, score-140.4), **Vasai Virar** (Rank 32, score-140.1), Kolkata (Rank 33, score-137), **Jodhpur** (Rank 34, score-136.9), **Asansol** (Rank 35, score-135.7)	>40-80	–	>25-50	**Agra (50)**, Kanpur (50)

Population wise category	Swachh Vayu Survekshan, FY 2022–23		82 NCAP cities, FY 2022–23		42 XV-FC cities, FY 2022–23	
	Rank/ Score achieved (out of 200)	City/Town	Score achieved (from 0 to >100)	City/Town	Score achieved (out of 100)	City/Town
	Rank 36 to 44 (score below 130)	***Amritsar** (Rank 36, score-127.3)*, ***Chennai** (Rank 37, score-124.4)*, ***Ranchi** (Rank 38, score-117.8)*, ***Kota** (Rank 39, score-116.1)*, ***Aurangabad** (Rank 40, score-114.6)*, Gwalior (Rank 41, score-114), ***Jamshedpur** (Rank 42, score-101.5)*, *Howrah (Rank 43, score-100.9)*, ***Madurai** (Rank 44, score-82)*, Faridabad (NA)	Below 40	**Delhi (0)**, **Chandigarh (0)**	Below 25	**Patna (25)**, Faridabad (25), Gwalior (25), **Vasai Virar (25)**, **Ludhiana (25)**, **Jodhpur (25)**, **Ghaziabad (25)**, **Lucknow (25)**, **Meerut (25)**, **Asansol (25)**

Source: Compiled by CSE from various sources. Data taken from PRANA Portal Swachh Vayu Survekshan 2023 Result, Minutes of thirteenth meeting of the Implementation Committee for NCAP, CPCB, 26 June 2023

Note:

- Bold text (Red highlighted) indicates the **common best-performing cities** under different assessments—Swachh Vayu Survekshan, NCAP and XV-FC.
- Bold text (Blue highlighted) indicates the **best/good-performing cities** under Swachh Vayu Survekshan but the least-performing under NCAP/ XV-FC.
- Bold Italic text (Green highlighted) indicates the **best/good-performing** cities under NCAP/XV-FC but the least-performing under Swachh Vayu Survekshan.

Category II: Population between 3–10 lakh (No. of cities: 44)

Population-wise category	Swachh Vayu Survekshan, FY 2022-2023		82 NCAP cities, FY 2022-23	
	Rank/ Score achieved (out of 200)	City/Town	Score achieved (from 0 to >100)	City/Town
Category II: Population from 3 to 10 Lakhs (44 cities)	Rank 1 to 6 (score >180)	**Amravati** (Rank 1, score-194), **Moradabad** (Rank 2, score-186.2), **Guntur** (Rank 3, score-185.5), **Firozabad**, **Rajahmundry** (Rank 4, score-183), **Ujjain** (Rank 5, score-182), **Bareily** (Rank 6, score-180.5)	Above 100	**Bareily (346)**, ***Durgapur (288)***, ***Gulburga (275)***, **Firozabad (194)**, **Moradabad (168)**, **Gorakhpur (152)**
	Rank 7 to 17 (score >160-180)	**Jhansi** (Rank 7, score-176), Navi Mumbai (Rank 8, score-175.5), **Sagar**, **Cuttack** (Rank 9, score-170.7), **Rourkela** (Rank 10, score-170.5), **Gorakhpur**, Nellore (Rank 11, score-169), **Bhubaneswar** (Rank 12, score-166.7), **Udaipur** (Rank 13, score-165.5), **Kurnool** (Rank 14, score-162.1), **Chandrapur**, **Patiala** (Rank 15, score-162), **Gaya**, ***Durgapur*** (Rank 16, score-161.7), **Latur** (Rank 17, score-160.1)	>80-100	**Latur (100)**, ***Jalandhar (100)***, **Dehradun (83)**

	Rank 18 to 30 (score >130-160)	**Dehradun** (Rank 18, score-152), **Solapur** (Rank 19, score-150), **Kadapa** (Rank 20, score-149.8), **Anantapur** (Rank 21, score-144.7), ***Gulburga*** (Rank 22, score-144.2), **Kolhapur** (Rank 23, score-137.5), **Noida** (Rank 24, score-136), Hubli-Dharwad (Rank 25, score-135.1), **Korba** (Rank 26, score-135), **Alwar** (Rank 27, score-134), Barrackpore (Rank 28, score-133.2), Muzaffarpur (Rank 29, score-132.9), Badlapur (Rank 30, score-130.7)	>40-80	**Rajahmundry (50), Ujjain (75), Patiala (80)**
	Rank 31 to 38 (score below 130)	Ulhasnagar (Rank 31, score-129.5), Akola (Rank 32, score-129.2), Jalgaon (Rank 33, score-123.7), Devanagere (Rank 34, score-122.4), Sangli (Rank 35, score-120.1), ***Jalandhar*** (Rank 36, score-119.5), Guwahati (Rank 37, score-116.2), Jammu (Rank 38, score-102.8)	Below 40	**Kolhapur (40), Sagar (33), Guntur (0), Jhansi (0), , Cuttack (0), Rourkela (0)**, Nellore (0), **Bhubaneswar (0), Udaipur** (0), **Kurnool** (0), **Chandrapur** (0), Gaya (0), Solapur (0), **Kadapa (0)**, Anantapur (0), Noida (0), Korba (0), Alwar (0), Muzaffarpur (0), Akola (0), Jalgaon (0), Devanagere (0), Sangli (0), Guwahati (0), Jammu (0), **Amravati (0)**

Source: Compiled by CSE from various sources. Data taken from PRANA Portal- Swachh Vayu Survekshan 2023 Result, Minutes of thirteenth meeting of the Implementation Committee for NCAP, CPCB, 26 June 2023

Note:

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- Bold Italic text (Green highlighted) indicates the **best/ good-performing** cities under NCAP/XV-FC but the least-performing under Swachh Vayu Survekshan

Category III: Population under 3 lakh (No. of cities: 40)

Population-wise category	Swachh Vayu Survekshan ranking (131 cities), FY 2022-23		82 NCAP cities, FY 2022-23	
	Rank/ Score achieved (out of 200)	City/Town	Score achieved (from 0 to >100)	City/Town
Category-III: Population less than 3 lakh (40 cities)	Rank 1 to 5 (score >180)	**Parwanoo** (Rank 1, score- 193.6), **Kala Amb** (Rank 2, score-193), **Angul** (Rank 3, score-187.5), **Raebareli** (Rank 4, score 183.2), **Talcher** (Rank 5, score-181.7)	Above 100	***Byrnihat*** *(1120)*, ***Thoothukudi*** *(350)*, **Raebareli** (110), **Haldia** (200), ***Pathankot/Dera Baba*** *(>100)*, ***Silchar*** *(350)*, **Nalgonda** (567), **Kalinga Nagar** (167), **Nalagarh** (114)
	Rank 6 to 19 (score >160-180)	**Dewas** (Rank 6, score-180), **Haldia** (Rank 7, score- 177.5), **Vizianagaram** (Rank 8, score-176.5), **Paonta Sahib** (Rank 9, score-174.5), Naya Nangal (Rank 10, score-173.5), **Damtal, Balasore** (Rank 11, score-171.5), **Baddi** (Rank 12, score-171.2), **Sangareddy** (Rank 13, score-167.6), **Nalagarh** (Rank 14, score-165), Ongole (Rank 15, score-164), **Gajraula** (Rank 16, score-163.5), **Kalinga Nagar** (Rank 17, score-162.2), Gobindgarh (Rank 18, score-161.6), **Nalgonda** (Rank 19, score-161.3)	>80-100	**Parwanoo (100)**, ***Nalbari*** *(100)*, ***Khanna*** *(83)*

	Rank 20 to 31 (score >130-160)	**Eluru** (Rank 20, score-159.7), **Sunder Nagar** (Rank 21, score-159.1), **Chitoor** (Rank 22, score-158.9), ***Nalbari*** *(Rank 23, score-158.2)*, ***Silchar*** *(Rank 24, score-155.5)*, Sibsagar (Rank 25, score-154.8, Kashipur (Rank 26, score-154.6), ***Khanna*** *(Rank 27, score-154.5)*, Khurja (Rank 28, score-150.4), Srikakulam (Rank 29, score-150.2), Nagaon (Rank 30, score-141.5), Rishikesh (Rank 31, score-140)	>40-80	Naya Nangal (60)
	Rank 32 to 39 (score below 130)	***Pathankot/Dera Baba*** *(Rank 32, score-128.1)*, Anpara (Rank 33, score-126.2), Dimapur (Rank 34, score-123.7), ***Thoothukudi*** *(Rank 35, score-120.7)*, Jalna (Rank 36, score-113.9), Dera Bassi (Rank 37, score-93.3), ***Byrnihat*** *(Rank 38, scroe-69.8)*, Kohima (Rank 39, score-64.3)	Below 40	**Gajraula (<40),** Srikakulam (33), Kashipur (25), Khurja (14), **Kala Amb (0), Angul (0), Talcher (0), Dewas (0), Vizianagaram (0), Paonta Sahib (0), Damtal (0), Balasore (0), Baddi (0), Sangareddy (0), Ongole (0), Gobindgarh (0), Eluru (0), Sunder Nagar (0), Chitoor (0),** Sibsagar (0), , Nagaon (0), Rishikesh (0), Anpara (0), Dimapur (0), Jalna (0), Dera Bassi (0), Kohima (0)

Source: Compiled by CSE from various sources. Data taken from PRANA Portal- Swachh Vayu Survekshan 2023 Result, Minutes of thirteenth meeting of the Implementation Committee for NCAP, CPCB, 26 June 2023

Note:

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Index

Swachh Vayu Survekshan assessment, 2023	
Score obtained	**Performance**
180 & above	Best
>160-180	Good
>130-160	Average
Below 130	Below average

82 NCAP cities assessment, 2023	
Score obtained	**Performance**
100 & above	Best
>80-100	Good
>40-80	Average
Below 40	Below average

42 XV-FC cities assessment, 2023	
Score obtained	**Performance**
Above 75-100	Best
>50-75	Good
>25-50	Average
Below 25	Below average

Annexure 7: Sector-wise indicators provided by the Central Pollution Control Board (CPCB) reporting quarterly progress

The Central Pollution Control Board (CPCB) has provided sector-wise indictors for reporting quarterly progress on the city clean air action plans. Here is the list of indictors for three critical sectors—industry, vehicles and transport, and waste management to control open burning.

Industry

IP 1.11 Action/closure against defaulting/unauthorized industrial units - Number of show-cause notices/closure notices issued per quarter
IP 1.3 Shifting of polluting industries: Number of polluting industries identified
IP 1.15 Industries allowed with stringent environmental norms only.
IP 1.25 Initiated Star Rating Programme; Has it been completed?
IP 1.29 Prepare and implement local area action plan for pollution hotspots and strict enforcement of air pollution control measures in all industries, including those located in unauthorized areas. Details on the action undertaken
IP 1.30 Assess the number of industrial units that are non-compliant and prepare unit/plant wise action plan for time-bound compliance or be shut down. Details of action Taken
IP 1.31 Carry out pollution load estimation from industrial sector to enable setting of target for emission; Details of action taken
IP 12.1 Strong siting policy for Waste-to-Energy plants: Whether policy notified?
IP12.2 Strong siting policy for biomedical incineration plants: Whether policy notified?
IP 12.3 Implement CEMS for incinerators and provide data on emissions on an open platform: Number of incinerators with CEMS; Total number of Incinerators; Platform developed for data on emissions from incinerators?
CPCB indicators
IP 7.1 Coal-fired boilers to be converted to oil/gas fired driers, preferably with coal bed methane (CBM)
IP 4.1 Introduction and shifting towards cleaner fuels in industries - Action completed (Y/N)? Provide details
IP 4.2 Conversion to CNG/PNG/LPG from pet coke/wood/coal and urgent ban on furnace oil, pet coke which are dirty industrial fuels with high sulphur and heavy metals.
IP 4.3 Strict enforcement against illegal use of such fuels, including fuels which do not have specifications laid down or are included in the acceptable fuels as mandated by state pollution control boards - Details of action completed.
IP 4.4 Establish a protocol for using cleaner fuels and technology in industries - Provide details and attach protocol copy
IP 4.5 Restriction on using un-authorized fuels in industries
IP 4.6 Sulphur reduction in fuel
IP 4.7 Alternate fuel: Hotel industry directed to change fuel patten from HSD to Natural Gas.
IP 1.28 Implementation of SOx and NOx standards notified by MoEFCC; Compliance status: Whether all industries as notified in standards complied?
IP 3.1 There should be provision to use CEMS data as legal evidence and a policy be framed in consultation with Central Pollution Control Board.
IP 3.2 Implement Continuous Emission Monitoring System (CEMS) across all targeted and applicable polluting industry - Number of targeted and applicable industries without CEMS
IP 3.3 Development of mobile facility/van for continuous ambient air quality monitoring for different localities - Details of actions undertaken
IP 3.4 Live camera feed and to take action against non-complying industrial units - Details of action undertaken

All indicators under IP 8 (control of fugitive emissions in industries)

IP 8.1 Use of hoods and enclosure for all process equipment, hooding of emission controls of the blast furnace tapping operations and discharge of molten metal and slag, covering of ladles containing molten metal
IP 8.2 Scrap management programme for the prevention or minimization of contaminants in steel scrap and other feed materials
IP8.3 Use of covered or enclosed conveyors and transfer points
IP 8.4 Enclosures for emission controls of the charging and tapping operations
IP 8.5 Minimizing the number of flanges by welding piping connections wherever possible and using appropriate sealing for flanges and valves - Details of action taken
IP 8.6 Wet quenching of coke as opposed to conventional quenching - Details of action taken

IP 8.7 Use of larger oven chambers and regulation of pressure within oven chambers
IP1.32 Industrial units to install water spraying system of internal roads and washing of tires of vehicles
Additional indicators from management of road dust to be used to check progress in industrial zones:
RD 1.3 Regular cleaning of street surfaces and spraying of water to suppress dust
RD 1.6 To take appropriate action to remove road dust/silt regularly by using mechanical sweepers
RD 1.7 End-to-end paving of the road

Brick kilns

IP 5.1 Adapting new technologies for brick kilns - Number of brick kilns switched to new technologies; Total number of brick kilns
IP 5.2 Identification of brick kilns and their regular monitoring including use of designated fuel and closure of unauthorized units; Details on the action undertaken
IP 5.3 Conversion of natural draft brick kilns to force/induced draft - Number of brick kilns switched to force/induced draft; Total number of natural brick kilns
IP 5.4 Closure of unauthorized units by seeking the possibility for shifting of kilns outside corporation limits - Number of unauthorized units closed; Number of units within corporation limits
IP 5.5 Prescribe design specifications for improved kilns and ensure compliance checking to know that conversion has actually taken place; Details on the action undertaken

Vehicles and transport

Emissions standards, fuel quality and on-road vehicles

VE 1.1 Number of PUC centres in the city.
VE 1.2 Regular checking of vehicular emissions and issue of Pollution Under Control Certificate (PUC); No. of challans issued for lack of PUC certificate
VE 1.3 Auditing and reform of Pollution Under Control (PUC) Certificate; Number of PUC centres linked with remote server; Frequency of audit per annum
VE 1.4 Linking of PUC centres with remote server and eliminate manual intervention in PUC testing. Number of PUC centre linked with remote server
VE 1.5 Integrate on-board diagnostic (OBD) system fitted in new vehicles with vehicle inspection; Number of vehicles with OBD and total number of vehicles in city.
VE 1.6 Link PUC certificates with annual vehicle insurance; Policy notified?
VE 9 Periodic calibration test of vehicular emission monitoring instrument. SOP for calibration of emission monitoring instrument prepared?
VE 10 To check the calibration of emission monitoring equipment, housed in Emission Testing Centres (ETCs) once in 6 months to know the status of equipment; Checks conducted.
VE 11.1 Inspection/maintenance to all BS II & BS III; Number of BS II and BS III vehicles impounded/scrapped, Total number of BS II and BS III vehicles plying.
VE 11.2 Restriction on plying and phasing out of 15-year-old commercial diesel driven vehicles. Number of impounded/scrapped 15-year-old diesel vehicles, Total number of 15-year-old diesel vehicles
VE 11.3 Enforcement of law against visibly polluting vehicles: remove them from road, impose penalty, and launch extensive awareness drive against polluting vehicles; Number of visibly polluting vehicles impounded/challaned.
VE 11.4 Initiate steps for retrofitting of particulate filters in diesel vehicles, when BS VI fuels are available; No of vehicle with particulate filter, Total number of vehicles that would need to be retrofitted
VE 11.5 To increase fine on vehicle owners (not drivers) where visible smoke is emitted and noticed; Total fine imposed on vehicle owners per quarter.
VE 11.6 Examine existing framework for removing broken down buses or trucks from roads and create a system for speedy removal and ensuring minimal disruption to traffic from such buses or trucks; Steps taken in this direction.
VE 11.7 The restriction on use of two-stroke vehicles in phased manner (2-Stroke, 3-stroke); Number of two-stroke vehicles still plying.
VE 2 Vehicle labelling or sticker programme. Steps taken in this direction.
RD 1.13 Implement truck loading guidelines; use of appropriate enclosures for haul trucks; gravel paving for all haul routes
VE 3.1 Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue; Steps taken in this direction.
VE 3.2 Provide truck rest areas/parks along national and state highways to prevent entry of trucks into cities during peak

hours; Rest areas provided along all NH and SH
VE 3.3 Diversion of truck traffic; Steps taken in this direction.
VE 3.4 Check overloading: Use weigh-in-motion bridges/machines (WIM) and weigh bridges at entry points to the city to check the payload of commercial vehicles. As per the CMVR, a penalty of 10 times the applicable rate for overloaded vehicles is applicable; Entry points with weigh-in-motion bridges/machines (WIM) and total number of entry points
VE 6.1 Regulate the taxi industry; steps taken in this direction.
VE 6.2 Assess and introduce a city bus system of appropriate fleet size of small buses and desirable bus type replete with GPS tracking, ETVMs for fare collection and passenger information systems; steps taken in this direction.
VE 6.3 Develop route plan for bus operation; target trunk roads; steps taken in this direction.
VE 6.4 Intermediate public transport (IPT) and bus system; Total number of IPT per 1,000 population
VE 3.5 Define routes, permits, fares, vehicle design and safety standards, and vehicle technology standards for para-transit vehicles (goods carriers); Steps taken in this direction.
VE 6.5 Introduction of new electric buses (with proper infrastructure facilities such as charging stations) and CNG buses for public transport which will reduce plying of private vehicles on-road and help to curb tailpipe emissions.

Non-motorized transport

RD 1.12 Designing and construction of environmentally friendly roads; Steps taken in this direction.
RD 1.15 Create proper pedestrian infrastructure; Steps taken in this direction.
RD 2.6 Adopt street design guidelines for paving of roads and footpaths (hard and soft paving) and vegetative barriers; Notification issued or not.
VE 12.1 Introducing cycle tracks along with the roads; Kilometres of bicycle paths and lanes per kilometre of road.
VE 12.2 Prepare and implement zonal plans to develop an NMT network
VE 5.1 Prevent parking of vehicles in the non-designated areas; No. of challans issued and vehicles towed for parking in non-designated areas per month.
VE 5.2 Development of multilayer parking; Number of multilayer parking constructed.
VE 5.3 Penalize parking of vehicles in non-designated areas; Amount of penalty collected per month.

Waste and biomass: Dumping & burning

BB 1.1 Regular check and control of burning of municipal solid wastes; Number of inspections conducted.
BB 1.2 Defaulters for open burning to be fined; Penalty imposed amount per month.
BB 1.3 Identify garbage burning locations; Number of locations identified.
BB 1.4 Prohibition/complete ban on garbage burning; Whether notification issued.
BB 1.5 Launch extensive drive against open burning of biomass, crop residue, garbage, leaves, etc.; Whether drive was launched.
BB 1.6 Construction of advanced waste management site; Whether site constructed.
BB 1.7 Regular collection and control of municipal solid wastes; MSW (in tonne per day) collected every day and total generated MSW of the city.
BB 1.8 Providing organic waste compost machines, decentralization of processing of waste, dry waste collection centres; Number of machines for organic waste compost and waste processing and dry waste collection centres.
BB 1.9 Awareness for controlling of burning of agricultural waste and crop residues; Steps taken in this direction.
BB 1.10 No plot should be left open more than 02 years and planting of trees must be mandatory on vacant plots; Number of open plots identified and greened.
BB 1.11 Dead bodies of animals should be disposed through proper treatment facility like rendering plant, etc.; Number of treatment facilities.
BB 10.1 Proper management of landfill sites to prevent spontaneous fire; Number of landfill fires at each site and steps taken.
BB 10.2 Adopt roadmap for zero landfill policy to promote decentralized waste segregation, reuse and recycling; Steps taken in this direction.
BB 2 Ensure segregation of waste at source; Number of colonies where waste segregation at source is being practiced and total number of colonies.
BB 3 Proper collection of horticulture waste and its disposal following composting cum gardening approach; Number of composting cum gardening sites development.
BB 4 Recycling plants for dry waste; Number of recycling plants identified.
BB 5 Ambient air quality monitoring of municipal dumping sites and parks; Number of municipal dumping sites and parks monitored.

BB 6 Check/stop on Stubble Burning; Number of inspections conducted and whether any notification issued.
BB 8 Use of Piped Natural Gas (PNG) for human cremation; Number of cremation sites which use PNG.
BB 9 Use of satellite-based monitoring as well as mobile spot check squads for enforcement; Steps taken in this direction.
BB 11 Fire crackers—regulate to control their usage; Steps taken in this direction.

C&D waste

C&D 1.1 Ensure transportation of construction materials in covered vehicles; number of challans issued regarding the same.
C&D 1.2 Strict enforcement of CPCB guidelines for construction (use of green screens, side covering of digging sites, etc.); Steps taken in this direction.
C&D 1.3 Restriction on storage of construction materials along the road; Number of challans issued regarding the same.
C&D 1.4 Covering methods of construction sites; Number of challans issued regarding the same.
C&D 1.5 To create separate space/zone for handling solid-waste and C&D waste and other waste in the city; Number of such sites established.
C&D 1.6 To mandate facility of tar road inside the construction sites for movement of vehicles carrying construction material; Steps taken in this direction.
C&D 1.7 Promotion of the use of prefabricated blocks for building construction; Steps taken in this direction.
C&D 1.8 Enforcement of Construction and Demolition Waste Rules; Steps taken in this direction.
C&D 1.9 Control measures for fugitive emissions from material handling-conveying and screening operations; Steps taken in this direction.
C&D 1.10 Develop and implement dust control measures for all types of construction activities—buildings and infrastructure; Notification on dust control measures
C&D 1.11 Enforce restrictions on construction activities within urban airshed zones during high pollution period; Notification on high pollution period measures.
C&D 1.12 Frame and implement policy for segregation of construction and demolition waste and provide a network of decentralized C&D waste segregation and collection sites across the city; Notification of policy and no. of C&D waste sites established
C&D 1.13 Promote recycling of construction and demolition waste. Steps taken in this direction.

Annexure 8: Indicative snapshots of sectoral action reported by cities on PRANA portal

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Vijayawada Municipal Corporation, Andhra Pradesh	"Remediation of Ajith Singh Nagar dump site through Biomining process in VMC" Cleared site for park development with a project cost of Rs10 Cr. CNG-based waste collection vehicles and RFID tag scanning. Door-to-door segregated waste collection, garbage lifting and road sweeping. Onsite compost, wet waste processing units, bio-methanation, windrow mixed waste processing unit Development of plastic ban	C&D waste processing plant		VMC officials-using electric vehicles	Cleanliness drives, water fountains eEnd-to-end paving, water Sprinkler Vehicles & Jatayus-mechanized sweeping Avenue plantation on central medians, canals bund greenery	LPG gas crematoriums
Ananthapuramu Municipal Corporation, Andhra Pradesh	Legacy waste remediation			Vertical parking system 12 battery vehicles to the field-level functionaries	Development of vertical gardens and landscaping Road repairs and new roads construction Road pavements and widening of urban link roads	LED display screens to show measures to be taken daily by public CAAQMS Introduced

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Vadodara city, Gujarat	2 Legacy waste bioremediation– 17 acres and 12 acres of land reclaimed. My Beat, Clean Beat- Each day beat-wise safai-sevak cleaning activity. Quick Response Team under "Nirmalayam" – resolution of complaints within 2 hrs Mobile Court- Every day 130-150 cases related to sanitation are solved via the mobile court and fine on defaulters.			12 E-rickshaws for fine collection for daily cleaning purpose Lokarpan of 120 Swachhta patrol tricycles- for effective cleaning operation in narrow streets, more e-rickshaws added health and sanitation		
Rajkot Municipal Corporation, Gujarat						Urban forest project called Ram-Van near Aji Dam- includes various sculptures, cycle track, walking track, rejuvenation of natural water, playground for children, amphitheatre, solar led light beautification, etc.

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
						Civil work- pathway, gazebo, compound wall, toilet block, office building and mini auditorium, pond development and amphitheatre and others finishing & sculpture work, tree plantation
Kalaburagi City, Karnataka						Road dust- Mechanical sweeping, tree plantation, paving of partially paved and unpaved roads. Adoption of parks by industries under CSR
Madhya Pradesh Asia's largest CNG plant Immediate	Lifting of solid waste generated from desilting and cleaning of municipal drains for its disposal	C&D waste recycled products		Development of multi-layer parking Create proper pedestrian infrastructure	End-to-end paving and road design improvement, black-topping of unpaved road, water fountains at a major traffic intersection, designing and construction of environment friendly road Creation of green buffers along the traffic corridors	Daily Air Quality Public Information Dissemination System

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Gwalior city, Madhya Pradesh	Development of urban forest in the dumping site	Construction and Demolition Waste Processing and Recycling Plant Reuse of treated effluent C&D waste management model- an agency to collect, transport, process and recycle C&D waste collected from the collection centres by paying tipping fees and GMC brought back 30% by-product from the agency.		Multi-level parking	Dust free roads Decongestion of roads- area dust free and improve the traffic congestion & less prone to accident Mechanized road sweeping Water fogging machine	Green areas and vertical gardens, roadside greening and paving Wind Augmentation Purifying Unit (Air Purifier)
Bhopal, Madhya Pradesh	Solid waste management- Deployment of 450 D2D CNG vehicles for waste collection, Construction of 11 ultra-modern garbage transfer station, Establishment of 1,000 TPD waste processing facility, Construction of scientific landfill in 5 acres area, Treatment of 12 lakh MT legacy waste (bioremediation-scientific treatment, development of green area and commercial use of land which generates revenue), Installation of twin litter bins on road side.	Dust management- Installation of 100 TPD C&D waste treatment facility		Transportation/ machinery- Procurement of 25 CNG Vehicles, 300 CNG Buses for City Transportation	Procurement of 4 sweeping machines, procurement of foggers Pavement, construction of roads, restoration of roads Construction of fountains on major squares, deployment of mechanical sweepers, road side plantation, development of green belts	Capacity building and public grievance- Deployment of NGO Volunteers in each Zone, Awareness through waste banners and posters, IT enabled public grievance system, Toll free number for complaints, Special AQI cell for Monitoring

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Sangareddy Municipality, Telangana	100% Door-to-Door collection by Swachh Autos Commercial waste collection by covered trucks				Maintenance and construction of new roads Road Dust Control: Mechanized sweepers and manual sweeping Black topping of the roads Laid end to end roads for free vehicular movement	Telangana ku Haritha Haram Programme' to increase the green cover area Avenue plantation, bund and institutional plantation Development of Miyawaki park and nurseries Distribution of homestead plants to households
Greater Chennai Corporation, Chennai City, Tamil Nadu	Waste dumping and landfill burning – Regular collection and control of MSW Construction of advance waste management site	Door-to-Door collection C&D waste processing units		Modal shift towards Public Transport Intelligent Traffic Systems NMT: Creation of cycle tracks along the roads Introduction of E-vehicles and multilevel parking	Road dust control: Mechanical sweepers & manual sweepers	Creation of Green Cover-Urban Greening with vertical Garden Green Buffers along the traffic corridors Source apportionment and carrying capacity assessment for Chennai city

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Madurai Corporation, Madurai city & Tiruchirapalii City Corporation, Tamil Nadu	Smart City Mission: Procurement of battery-operated vehicles for garbage collection Disposal - Reclamation of Legacy Waste-Biomining Process	Construction and Demolition Waste plant		Introduction of e-vehicles and charging stations Development of multilevel car parking (MLCP) and integrated bus stand NMT: Creation of cycle tracks along the roads	Road dust: Water sprinkling & mechanized sweepers	Tiruchirapalli city Emission inventory & Source apportionment study for the city Strengthening of Pollution Monitoring Mechanism River Front Development Gasifier Crematorium (LPG) Urban Forests (Miyawaki) & Vertical Garden Public awareness on pollution control measures
Thoothukudi City Corporation, Tamil Nadu		C&D waste and awareness			Road Dust: Water sprinkling & mechanized sweepers Paving of roads Port trust to control the spillage on roads by vehicles	Air pollution source study

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Bhubaneswar-Odisha			Geospatial Artificial Intelligence (GeoAI) for brick kilns- To improve the environmental compliance of brick manufacturing units Development of mobile application (GeoAI Platform)- To monitor & capture status of each brick kiln units, technology etc.	Development of Clean Air Zone (CAZ) communication Green sticker system for local resident's private vehicle Promotion of electric vehicles Un-interrupted electric supply Promotion of cycling and pedestrian passage (NMT)		Establishing ambient air quality monitoring station Intensive emission monitoring for Generator sets Development of Breathable Cities Platform- To share the information, cases related to air pollution mitigation
Navi Mumbai Municipal Corporation (NMMC), Navi Mumbai, Maharashtra				Introduction of NMT Eco Mobility Project Public Bicycle Sharing (PBS) project commenced in 2018 Expanded the transport network to all wards in the city Introduced Electric Bicycles & bikes in 2019		

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Thane Municipal Corporation (TMC), Thane, Maharashtra		C&D Waste Management Project- Setting up of 300 TPD C&D waste management facility based on "Wet Process technology" Collection and transportation of C&D waste from concession area Provide infrastructure (container/ bin with GPS facilities and RFID tags) 'Scheduled/ On Demand Collection System' via a 24 x 7 helpline number Ensure compliances to all environment management plans as per MPCB Sludge management (final recovered products used to manufacture items)				

Cities	Municipal solid waste	Construction and demolition waste	Industry and thermal power plants	Vehicles and transport	Road dust and urban greening	Other area sources
Pune Municipal Corporation (PMC), Pune		Door-to-Door waste collection Installation of C&D waste processing plant		Introduction of Pune Street Program City Level Plan Development of pedestrian friendly streets as per the street design guidelines Promotion of cycle track along roads Development of e-buses, e- bus depot, EV Battery swapping and charging stations	Road dust: Mechanical street sweepers & water sprinklers	Electric crematoriums Green buffers along traffic corridors Public awareness & capacity building
Municipal Corporation Greater Mumbai (MCGM)				Traffic synchronization system in Mumbai to enhance the traffic mobility Proper traffic management achieved Provided safety to pedestrian as well as vehicles		Introduced Low-Cost Sensor based PM2.5 and PM10 monitoring network in state Installation of 40 Sensor based air quality systems Installation of Monostatic SODAR System by MPCB- Real-time data of air pollution meteorological parameters

Note: The data is from PDFs available on PRANA Portal under the best practices section – downloaded between November 2021and May 2022.

Caveat: This captures information only from PRANA portal at a given point of time. And may not include additional information with the state governments.

Source: PRANA portal, https://prana.cpcb.gov.in/#/resources

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The National Clean Air Programme (NCAP) is the first ever time-bound, target-oriented clean air programme with performance-linked funding strategy for cities.

The Centre for Science and Environment (CSE) has carried out this rapid review to understand the gaps and further needs for a more robust and expanded programme.

This assessment finds that in the next phase it is necessary to shift the focus towards implementation of priority action in key sectors of pollution at a scale and link the performance-linked funding with targeted milestones. The metrics of performance assessment should change accordingly. Only this can make a difference to air quality.

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