National Clean Air Programme (NCAP): Framework for national air quality management in India: Key elements in place

- **Identification of non-attainment cities:** Progressively **131 cities** designated due to high particulate levels exceeding NAAQS

- **Air quality targets:**
  - To reduce particulate concentration by 20–30% by 2024 (base year of 2017), Further revised to **40% reduction by 2025–26** (base year of 2019–20).
  - XV-FC cities also assigned an annual target to reduce PM10 by **15%** and **increase the number of good air quality days** (Air Quality Index below 200)
  - Under NCAP, annual targets given by CPCB to 90 cities (82 NCAP cities and seven XV-FC cities-later Raniganj merged with Asansol) for reduction in PM10 concentrations by **3–15 per cent.**

- **Performance-linked funding with three verticals:**
  - Direct funding from 15th Finance Commission grant (Million-Plus Cities Challenge Fund) to 49 cities
  - Fund allocated by MoEFCC to 82 cities under the NCAP programme
  - Convergence funding i.e. alignment of separate sectoral funds and schemes to deliver on clean air objectives

- **Framework for reporting, monitoring and verification adopted for compliance**
National Clean Air Programme (NCAP): Evolving scope

<table>
<thead>
<tr>
<th>Scope</th>
<th>Status of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanding scope</td>
<td></td>
</tr>
<tr>
<td>City Action Plans</td>
<td>131 cities</td>
</tr>
<tr>
<td>State Action Plans</td>
<td>24 states</td>
</tr>
<tr>
<td>Annual Action Plans</td>
<td>128 cities, 3 awaited</td>
</tr>
<tr>
<td>Hotspot Action Plans</td>
<td>106 cities, 25 under process</td>
</tr>
<tr>
<td>Emergency Response Plans</td>
<td>131 cities</td>
</tr>
</tbody>
</table>

Multi-sector actions plans
- Air quality management and monitoring
- Conduct source apportionment and inventory studies
- Hotspot pollution
- Industrial pollution
- Power plants
- Vehicle and transportation strategies
- Open burning of waste
- Construction and demolition waste
- Solid fuel burning and household emissions
- Diesel Generator Sets
- Road dust
- Greening
- Crop residue burning
- Recognize and replicate best practices

Supportive action
- Institutional framework and arrangement
- Capacity building, public outreach
- Centralized web portal - PRANA for reporting and monitoring

Source: PRANA Portal- Minutes for 3rd meeting of National Apex Committee under NCAP, 8 Feb 2024
Have cities utilized funding effectively?

Has NCAP helped to reduce air pollution?

Has NCAP enabled mitigation in key sectors of pollution

What are the missing links?
How funds have been utilised?
Status of funds released and utilized

- Overall: Fund released to 131 NCAP cities: Rs. 10,566 Cr; Utilized- 6806.15 Cr (64%), as of 3rd May 2024
- Utilization of funds in 82 cities is lower compared to 49 XV-FC cities
  - 82 NCAP cities- Rs.1616.47 Cr (released); Utilized: Rs 831.42 Cr (51%)
  - 49 XV-FC cities: Rs. 8951 Cr fund released; Utilized Rs 5,974.73 Cr (67%)
- Fund released for 82 NCAP cities is much lower than the 49 XV-FC cities
- Big cities addressed under the XV-FC grant; smaller towns under the NCAP for funding

Utilization of funds under NCAP & XV-FC, 2019–20 to 2023–24

Source: PRANA Portal- Minutes for 16th meeting of Implementation Committee for NCAP, 3 May 2024
City-wise status of fund released and utilized.....

- NCAP funding during 2019-24 (till 3 May 24)
  - Rishikesh, Ujjain, Guwahati and Korba—utilized over 70% of the funds
  - Anantapur, Delhi, Angul, Kolhapur, Gulbarga and Noida—utilized below 40%

- XV-FC grant during 2020-24,
  - Lucknow, Hyderabad and Greater Mumbai —show over 70% utilization.
  - Nine cities, Faridabad, Jamshedpur, Vijayawada, Nashik, Vasai Virar, Pune, Visakhapatnam, Nagpur and Bangalore—show less than 40% utilization

- Cities showing low utilization also show higher PM10 concentrations
Where is the money going? – largely road dust control
Dust management hogs major share of spending

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

- Out of 4,974.08 Cr,
  - Road dust sector (64%)
    - Industry sector (0.61%)
    - Vehicle sector (12.63%)
    - Biomass burning (14.51%)
    - Capacity building (6%)

- Road dust mitigation measures (paving, road widening, pothole repair, water sprinkling, mechanical sweepers etc.) taken the lion’s share of the funds for clean air action

Source: PRANA Portal: Minutes for 15th Meeting of Implementation Committee for National Clean Air Programme, 24 November 2023
Evolving metrics for performance-linked funding
Assessment 1: CPCB assessment for FY 2020-21

82 NCAP cities: Evaluation of cities based on the 3 parameters (Parameter A, B C)
Parameter A: Strengthening of the pollution monitoring mechanism
Parameter B: Source-wise cause analysis for air pollution
Parameter C: Progress on action plan and compliance of statutory guidelines/rules

42 XV-FC cities: Evaluation of cities based on the 4 parameters (Parameter A, B C and D)
Parameter A: Strengthening of the pollution monitoring mechanism
Parameter B: Source-wise cause analysis for air pollution
Parameter C: Progress on action plan and compliance of statutory guidelines/rules
Parameter D: Quantification and evaluation of air quality improvement, includes-
   a) Reduction in particulate matter (PM10)
   b) Increase in good days (AQI <200)

Assessment 2: CPCB assessment for FY 2021-22 (Beginning of performance-linked funding)

82 NCAP cities: Evaluation of cities based on Parameter D- Quantification and evaluation of air quality improvement), under which one criterion considered for city assessment:
1. Reduction in annual average PM10 concentration (as per the target given)
   Timeframe- Base year to current year (2019-20 to 2021-22)

42 XVFC cities: Evaluation of cities based on the Parameter D- Quantification and evaluation of air quality improvement), under which two criteria considered for city assessment:
1. Reduction in annual average PM10 concentration (15 per cent and above)
2. Increase in good days (AQI <200)
   Timeframe- Financial year i.e. 1st April to 31st March, 2020-21 to 2021-22.
Performance linked funding based on assessment- NCAP/ XV-FC

82 NCAP cities- Criteria for Performance linked funding

<table>
<thead>
<tr>
<th>Basis of Scoring</th>
<th>Score assigned to city</th>
<th>Fund allocation</th>
</tr>
</thead>
<tbody>
<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 against 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>
</tbody>
</table>

- **Assessment year 2022-23**: 18 cities scored more than 100. Those eligible for 100% fund allocation, include Srinagar, Gorakhpur, Durgapur, Moradabad, Firozabad, Bareilly, Raebareli, Thoothukuddi, Haldia etc.
- **About 53 cities scored below 40** (least performing), -- Delhi, Chandigarh, Jhansi, Jammu, Noida, Rourkela, Cuttack, Guntur, Bhubaneswar, Udaipur, Angul, Kala Amb etc.

49 XV-FC cities- Criteria for Performance linked funding

<table>
<thead>
<tr>
<th>Reduction in annual average PM10 concentration (15% &amp; above)</th>
<th>PM10 Increase in good days (15% &amp; above)</th>
<th>Performance Score</th>
<th>Per cent of fund allocation based on performance score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td>75</td>
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<tr>
<td>High</td>
<td>Low</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>25</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Assessment year 2022-23**: Ahmedabad, Rajkot, Dhanbad and Varanasi --best-performing; -- obtained scores of 100, eligible for 100% fund allocation
- **Patna, Faridabad, Gwalior, Vasai-Virar, Ludhiana, Jodhpur, Ghaziabad, Lucknow, Meerut and Asansol** scored 25, -- least performing cities, -- not eligible for performance based grant
- **Remaining 26 cities** scored 75, eligible for 75% fund allocation based on performance
Swachh Vayu Survekshan (SVS) Assessment

- SVS ranks cities (population category-wise) based on implementation of activities approved under city action plans and PM10 levels in 131 NCAP cities for a financial year
  i. Category 1 (47 cities): Cities above 10 lakh plus population
  ii. Category 2 (44 cities): Cities above 3 lakh to 10 lakh population
  iii. Category 3 (40 cities): Cities under 3 lakh population

Rationale for evaluation
- Ranking considers eight sectors for implementation of action plans
- Specific weightage assigned to eight sectors:
  1. Biomass and municipal solid waste burning (20%)
  2. Road dust (20%)
  3. Vehicle emissions (20%)
  4. Industrial emissions (20%)
  5. Other emissions (10%)
  6. Dust from C&D waste (5%)
  7. Improvement in PM10 concentrations (2.5%)
  8. Public awareness (2.5%)

Assessment framework for SVS
- In assessment framework, about 200 marks have been distributed to each city across the different indicators (Waste management, road dust, vehicles and transport, public transport, e-mobility, industry, household fuel, electricity supply, awareness and outreach and improvement in PM10 concentration)
- Scoring is done according to following slabs: > 80 to 100%; 60 to 80%; >40 to 60%; >20 to 40%; >10 to 20%

2023 assessment:
- Population category 1: Indore has topped; followed by Agra and Thane
- Population category 2: Amravati has topped, followed by Moradabad and Guntur
- Population category 3: Parwanoo has topped, followed by Kala Amb and Angul
How do we understand performance based on air quality improvement and action taken?
City-wise targets for PM10 reduction given by CPCB

City-wise PM10 annual targets are fixed for the years 2021–22 to 2025–26 for 90 cities (base year of 2019–20)

- CPCB target for 2025–26: 24 highly polluted cities need to reduce PM10 concentrations by 30-45%
- 24 cities will remain in the critical category even after the targeted reduction in 2025–26, as their PM10 concentrations will still be 1.5 times higher than the permissible limits.
- Cities include Khurja, Moradabad, Gorakhpur, Delhi, Raniganj, Noida, Bareilly, Firozabad, Dehradun, Anpara, Gajraula, Howrah, Durgapur, Raebareli, Jammu, Rishikesh, Gobindgarh and Baddi etc.

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

<table>
<thead>
<tr>
<th>Name of the cities</th>
<th>No. of cities</th>
<th>Expected target to reduce PM10 concentration from 2021–22 to 2025–26 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gorakhpur, Moradabad, Firozabad, Khurja, Gajraula</td>
<td>5</td>
<td>40–45%</td>
</tr>
<tr>
<td>Delhi, Raniganj, Noida, Bareilly, Dehradun, Anpara</td>
<td>6</td>
<td>35–40%</td>
</tr>
<tr>
<td>Howrah, Srinagar, Jalandhar, Alwar, Durgapur, Udaipur, Raebareli, Jammu, Rishikesh, Kashipur, Gobindgarh, Baddi, Muzaffarpur</td>
<td>13</td>
<td>30–35%</td>
</tr>
<tr>
<td>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, Bymihat, Angul, Sangareddy, Kohima</td>
<td>35</td>
<td>25–30%</td>
</tr>
<tr>
<td>Thane, Sangli, Nellore, Guntur, Gaya, Sagar, Haldia, Pathankot/ Dera Baba, Vizianagaram, Akola, Srikakulam, Eluru, Devanagere, Ongole, Anantapur, Nalgonda, Rajahmundry, Jaigaon, Kurnool, Korba, Chittoor, Navi Mumbai, Kadapa, Silchar, Paonta Sahib, Nalbari, Sunder Nagar</td>
<td>27</td>
<td>20–25%</td>
</tr>
<tr>
<td>Prwanoo, Sibsagar, Damtal, Kala Amb</td>
<td>4</td>
<td>No target</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
<td></td>
</tr>
</tbody>
</table>
PM10 reduction targets in NCAP cities, 2022-23

Based on data reported in PRANA portal

- 25 cities (out of 90) have achieved the annual targets for FY 2022–23 under NCAP

- Nine cities have met the annual standards --- Sibsagar, Silchar, Parwanoo, Sundar Nagar, Thoothikudi, Latur, Nallore, Amravati and Sagar.

<table>
<thead>
<tr>
<th>City</th>
<th>WHO PM$_{2.5}$</th>
<th>PM$_{10}$ annual standard (60µg/m³)</th>
<th>Current PM$_{10}$ levels, 2022-23 (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khurja</td>
<td></td>
<td></td>
<td>192</td>
</tr>
<tr>
<td>Dehradun</td>
<td></td>
<td></td>
<td>155</td>
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<tr>
<td>Bareilly</td>
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<td>141</td>
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<td>Moradabad</td>
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<td>Raebareli</td>
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<td>Firozabad</td>
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<td>114</td>
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<td>Gorakhpur</td>
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<td></td>
<td>110</td>
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<tr>
<td>Alwar</td>
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<td>Talcher</td>
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<td>Srinagar</td>
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<td>Barrackpore</td>
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<td>Kolhapur</td>
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<td>Kohima</td>
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<td>Nava Nargal</td>
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<td>Sagar</td>
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<tr>
<td>Amravati</td>
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<td>Nellore</td>
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<td>70</td>
</tr>
<tr>
<td>Latur</td>
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<td></td>
<td>71</td>
</tr>
<tr>
<td>Thoothikudi</td>
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</tr>
<tr>
<td>Sunder Nagar</td>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>Parwanoo</td>
<td></td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>Silchar</td>
<td></td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Sibsagar</td>
<td></td>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>
PM10 reduction target not achieved by NCAP cities, 2022-23

Target not achieved by NCAP cities in 2022-23 based on current PM10 levels (PRANA portal)

- 2022-23: 64 out of 90 cities have not achieved the annual targets for FY 2022–23 under NCAP
- 2022–23, PM10 concentrations in the top ten polluted cities were 2 to 3.5 times higher than the prescribed standards
- The top ten polluted cities include Delhi, Noida, Gajaula, Jammu, Muzaffarpur, Anpara, Gaya, Baddi, Durgapur and Udaipur.

<table>
<thead>
<tr>
<th>City</th>
<th>WHO PM10 levels (µg/m³)</th>
<th>Current PM10 levels, 2022-23 (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>175</td>
<td>171</td>
</tr>
<tr>
<td>Noida</td>
<td>175</td>
<td>173</td>
</tr>
<tr>
<td>Gajaula</td>
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<tr>
<td>Jammu</td>
<td>175</td>
<td>173</td>
</tr>
<tr>
<td>Muzaffarpur</td>
<td>146</td>
<td>171</td>
</tr>
<tr>
<td>Anpara</td>
<td>126</td>
<td>146</td>
</tr>
<tr>
<td>Gaya</td>
<td>116</td>
<td>142</td>
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<tr>
<td>Baddi</td>
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<td>Durgapur</td>
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<td>Ullasenagar</td>
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<td>Faontu Sahib</td>
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<td>Angul</td>
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</table>

<table>
<thead>
<tr>
<th>City</th>
<th>WHO PM10 annual standard (60µg/m³)</th>
<th>Current PM10 levels, 2022-23 (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navi Mumbai</td>
<td>102</td>
<td>94</td>
</tr>
<tr>
<td>Dewas Gaya</td>
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<td>94</td>
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<td>Patiala Khanna</td>
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<td>Dimapur Patna</td>
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<td>Vizianagar</td>
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<td>Hebi-Dhanpur</td>
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<td>Korba</td>
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<td>Euru Jhansi</td>
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<td>Rajahmundry</td>
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<tr>
<td>Chittoor</td>
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</tr>
</tbody>
</table>

Key:
- Annual Target for PM$_{10}$, 2022-23 (µg/m³)
- Current PM$_{10}$ levels, 2022-23 (µg/m³)
Status of PM10 reduction target in NCAP cities, 2022-23: No information on what led to this reduction

- City-wise targets for reduction of PM10 concentrations for year 2021-22 to 2025-26 were fixed by CPCB, based on PM10 concentration levels in year 2019-20.

- Performance in 2022-23 was relative to the concentrations in the base year of 2019.

- A few cities have outperformed with respect to the target set by CPCB:
  - In 2022-23, Khurja required to reduce by 19% but achieved a reduction of 34%.
  - Moradabad needed to reduce by 19% as per the target. But reduced by 54%.
  - Gorakhpur needed to reduce by 21% according to the target; but reduced by 64%.
  - No detailed information on the action taken that have led to such substantial reduction.

Source: Compiled by CSE. Data based on PRANA Portal., as on 26 June 2023.
What message do we get from the ranking under NCAP & XV-FC and SVS? Difficult to establish link between action and air quality improvement

Performance across the three verticals (NCAP & XV-FC for PM10 improvement and Swachh Vayu Survekshan for action taken), are not aligned or comparable.

Eg 2022 -23 assessment:

i. Cities that are comparable:
   a. Population category 1: Indore, Srinagar, Bhopal and Trichy ranked best under SVS & under NCAP and XV-FC assessment
   b. Population category 2: Moradabad, Firozabad, Ujjain and Bareily at the top under SVS and NCAP assessment
   c. Population category 3: Parwanoo and Raebareilly at the top rank under SVS and NCAP assessment

ii. Cities that have scored high for good action under SVS are least performing on PM10 improvement under the NCAP/ XV-FC.

   a. Population category 1- Agra, Delhi, Ghaziabad, Meerut, Jabalpur and Chandigarh performed well under SVS but performed poorly under NCAP & XV-FC category for reducing PM10
   b. Population category 2- Amravati, Guntur and Rajahmundry, best performers under SVS but at the bottom scoring zero under NCAP assessment
   c. Population category 3: Kala Amb, Angul, Talcher have topped under SVS but at the bottom scoring zero under NCAP assessment
Adequate information is not publicly available on PRANA portal

- Cities upload city action plans, source apportionment studies, Graded Response Action Plan and Public Grievance Redressal system
- Information on fund utilization and annual PM10 data
- Information on meetings by different committees - National Apex Committee, Steering Committee, Monitoring Committee, and Implementation Committee
- Minutes of meetings get uploaded on the PRANA portal
- Updates on the actions being reported by cities is sourced from these reports.

Limitations:
- All information not publicly accessible.
- Does not fully capture the progress in states and cities. Detailed information limited to: (i) a few cities. (ii) specific departments, like Urban Local Bodies (ULBs), which are presenting during meetings.
- Incomplete data -- may not provide a comprehensive picture of progress
Need transparency in reporting on scope and impact of action

- How to explain the link between action and air quality?
- Also how to explain why states with high utilization (exceeding 60%) show low performance in PM10 reduction; -- Chandigarh, cities of Rajasthan (Alwar and Udaipur, Jodhpur, Jaipur and Kota), Uttar Pradesh (Ghaziabad, Lucknow, Meerut, Kanpur and Agra) and in Punjab (Ludhiana and Amritsar) etc

- No details are available about the scale and depth of policy measures implemented in cities

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

- Information is needed for cross learning among cities.

- Programme needs to drive large-scale and rapid action across all sectors to improve air quality
Lessons and the agenda for reform
PM10 based assessment is shifting attention towards road dust control

- Inadequate PM2.5 monitoring and more widespread manual monitoring are cited as the reason – All 131 NCAP cities have manual PM10 data
- But 100 NCAP cities now have real time CAAQM stations that can generate PM2.5
- As of October 2023: Nationally there are 931 manual stations under NAMP; 516 real time CAAQM -- of these 512 manual stations and 344 CAAQM are in NCAP cities
- It is immediately possible to shift all 49 million plus cities to PM2.5 based performance framework
- All cities have been asked to prepare GRAP for daily emergency based on AQI – this in any case requires real time data
- Cities in early phases of monitoring now are starting with real time monitoring (Haryana)
- **Going forward it will be tougher to show impact of action on PM10** as this is affected more by wind blown dust etc. Focus on management of specific source of dust – instead of metrics for ambient air quality
Make PM2.5 the benchmark for performance-linked funding

PM2.5 evidence from emissions inventories of 16 cities

PM2.5 more harmful

Combined impact of combustion sources – industry, transport, power plants, open burning, solid fuels for cooking etc is significant in many cities.

Share of secondary particulate in PM2.5 concentration (especially during winter) very high – implication for gaseous emissions from combustion sources.

As of Feb 2024 - 49 cities have completed source apportionment studies; 82 under progress

Need guidance on how to use them for informing priority action – need focus on exposure

Source: Various emission inventories of respective cities
Adopt standardized protocol for air quality trend analysis for compliance under NCAP

- **Continuous shift in the method of analysis** – change compared to base year; or annual change compared to previous year

- Annual change can be influenced by meteorology etc; global practice of three years of running average etc

- **Need more robust protocol** on statistical methods for addressing data gaps, outliers, averaging time, etc

- While protocol has been adopted for calculation of AQI based on real time data; there is no standardized protocol for long term trend analysis based on real time data

- Are all monitors to be considered?

- **Alternative monitoring methods not yet well integrated**
Sectors out of focus..... Combustion sources:
• Industry
• Power plants
• Transport
• Solid fuels etc
Weak focus on industry

- Limited information on action taken on industry and power plants
- Pollution sources outside municipal limits do not get adequate attention
- Reporting is largely business as usual, with minimal reporting on stack emissions inspection, challans and closure notices or notification of approved fuel list. Reporting limited to regulatory function of the regulators (inspection, challans etc)
- Only if a non-attainment city is an industrial city/town some additional steps on industrial pollution control get reported but not always.
- Lack of attention to small and medium scale units in non-confirming areas
- Detailed status of large, medium and small-scale industries, and red and orange categories of industries are not usually available
- Limited reporting on adoption of clean fuels, emissions control technologies, industrial processes by industry types in city progress report
- Fugitive emissions and industrial waste burning not within the scope
- Reporting not efficient in capturing the changes by the industry
- Need an effective tracking mechanism for on-the-ground implementation of technology and energy transformation in accordance with regulations and enforcement
More information on other platforms and not on PRANA

- More detailed action is sometime available outside the NCAP reporting system.

- 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 etc.

- MoEFCC’s Annual Report of 2023–24 provides more details on interventions in Delhi-NCR --- more quantitative information on sector-wise measures.

- **Burning of solid fuels remain neglected:** Solid fuel for cooking significant source of pollution – 25-30% -- among the top contributors in Indo Gangetic Plain
- Some steps – West Bengal -- to pilot clean cooking projects; replaced traditional stoves with LPG in open eateries
Transport sector sidelined

CPCB indicators include on-road emissions management, old vehicle phase out, vehicle electrification, public transport improvement, non-motorised transport and parking policy as a demand management measure.

CPCB indicators for transport sector are not well defined according to the existing transport and urban planning policies.

On-road emissions

- Progress reports largely confined to PUC, old vehicle phase out

- 91 cities have included Automated Testing Centres and 33 cities have mentioned registered Vehicle Scrapping Facility in Action plan – status not available

- State level fleet renewal and scrappage policies, are not adequately aligned with the scrappage and fleet renewal notifications of the MoRTH
Transport and mobility strategies are not well understood

Public transport not well integrated with clean air action

Some reporting on bus numbers; or few corridors of walking and cycling

Cities/states have not adopted and notified guidelines and service level benchmarks for public transport infrastructure and multi-modal integration

Due to lack of city level mandate for complete street improvement and management and infrastructure development, ULBs do not pay attention to fund allocation for walking and cycling

- CPCB indicators related to travel demand management measures such as parking policy also not well defined – focus more supply management and report on MLCPs

- CPCB indicators are not aligned with National Habitat Standards for transport, National Urban Transport policy, TOD Policy of MoHUA that underscored the demand management and restraint principles

- Align transport indicators more explicitly with the related central government policies that have established the targets and design principle.
Convergence funding show better performance – Sectoral funding tied with sectoral targets and mandate
Convergence funding – leveraging other schemes in the sector

**Swachh Bharat Mission (Urban) 2.0**
- Setting up of solid waste management processing facilities
- C&D waste management in 132 NCAP cities & 20 cities >5 lakh population
- Procurement of mechanical road sweepers in 132 NCAP cities & 20 cities >5 lakh population
- Remediation of all legacy waste dumpsites in all cities

**Smart Cities Mission**
- Urban mobility - Smart parking, intelligent traffic management and integrated multi-modal transport
- Waste Management & Water Management

**AMRUT**
- Green Spaces & Parks and Non-Motorised urban Transport (NMT)

**AMRUT 2.0**
- Rejuvenation of water bodies and creation of green spaces

**FAME; Metro Rail, Gas infrastructure**

Source: NCAP Steering Committee report 2022
Illustrating the case - Lucknow
Spending under direct funding

Dedicated NCAP and XV-FC funding – 2021-22
- Repair and interlocking of damaged roads; Purchase machines for patch repair related works, hawker zone management, paver blocks and garden rejuvenation, garden improvement and fountains
- IEC, EV procurement, mitigation of traffic congestion

Convergence funding – other sectoral funds and schemes: outside NCAP SBM 2.0
- Door to door collection – 8 collection centres; 8 more in the process with GPS enabled vehicles
- Legacy waste treatment; Compost pits
- 100 TPD Capacity C&D waste processing plant and 01 in process

Construction of roads: Status of Potholes free Road by LMC has been achieved by 99.1%; Anti smog guns for dust control

Vehicles- 337 PUC system connected to online server

Infrastructure for CNG & E-Mobility: 60 e-buses, 20 charging stations, of bio-ethanol

Greening – 1300 parks

Source: NCAP Steering Committee report 2022
Hyderabad: Dedicated and convergence funding

Action under XV-FC for the FY 2021-22 – Rs 118 cr
• 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
- **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
- Comprehensive Road Maintenance programme (CRMP)
- Strategic Road Development Plan (SRDP): Major corridors, major roads, Flyovers
- **Urban Forestry**: nurseries, tree samplings, Landscape greenery & Vertical Gardening at Flyovers
- **EVs**: 60 DC fast charger and 500 AC slow chargers, 167 EV charging stations (plan to expand to 2500 by 2025); **132 city CNG buses**

Source: NCAP Steering Committee report 2022
### Example -- Pune: Dedicated and convergence funding

<table>
<thead>
<tr>
<th>Schemes</th>
<th>Funds (in crores)</th>
<th>Initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart city mission</td>
<td>65.62</td>
<td>E-bus subsidy, environmental sensors, tree plantation, cycle track, ISWM</td>
</tr>
<tr>
<td>FAME-II Electric mobility</td>
<td>16.5</td>
<td>Procurement of 150 e-buses</td>
</tr>
<tr>
<td>NCAP</td>
<td>9.45</td>
<td>Mechanical sweepers, water sprinklers, public awareness &amp; capacity building, cycle track, electric crematoriums, green buffers</td>
</tr>
<tr>
<td>Majhi Vasundhara 2.0</td>
<td>3.00</td>
<td>Green areas, solar power, rainwater harvesting</td>
</tr>
<tr>
<td>PMC budget SWM</td>
<td>47.8</td>
<td>Mechanised road sweepers, C&amp;D waste processing plant, bio CNG plant</td>
</tr>
<tr>
<td>PMC and IITM</td>
<td>10</td>
<td>Under SAFAR- 10 CAAQMS</td>
</tr>
<tr>
<td>PMC budget- green cover and green buffers</td>
<td>13</td>
<td>Biodiversity park reservations, GIS tree census, road medians maintained, greening, amrut van</td>
</tr>
<tr>
<td>PMC budget- renewable</td>
<td>14</td>
<td>Solar panels, tax benefits- solar water heating</td>
</tr>
<tr>
<td>Crematoriums</td>
<td>20.35</td>
<td>APC for wood-fired crematoriums, Venturi type scrubber, electric crematoriums</td>
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</table>
# Pune: Convergence of central, state schemes and ULB action

<table>
<thead>
<tr>
<th>Schemes</th>
<th>Funds (in crores)</th>
<th>Initiatives</th>
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</thead>
<tbody>
<tr>
<td>PMC budget- Mobility</td>
<td>Footpath and cycle track- 80 cr</td>
<td>1. BRT</td>
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<tr>
<td></td>
<td>Pune cycle plan - 20 cr</td>
<td>2. Pune cycle plan</td>
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<td></td>
<td></td>
<td>3. Subsidy to 3-w auto rickshaws to CNG</td>
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<td></td>
<td></td>
<td>4. Pothole free road</td>
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<td></td>
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<td>5. Wall to wall paving and road design improvement</td>
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<td>6. Black topping of metalled roads</td>
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<td></td>
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<td>7. Pune street program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Urban street design guidelines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Parking policy</td>
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<td>10. Pedestrian policy</td>
</tr>
</tbody>
</table>

Pune City total funds for improving Air quality – **Rs 13,489.37 Cr** (excluding NCAP & XVFC)

Source: NCAP Steering Committee report 2022
NCAP and regional approach

Going beyond city limits to take a regional approach

- Cities cannot achieve their clean air goals only through local measures; **regional-level action** is necessary to mitigate the impact of trans-boundary pollution.

- NCAP has recognized the idea of **regional approach and interstate coordination**.

- **Comprehensive regional plan** needs to be formulated incorporating the inputs from the regional source apportionment studies.

- **State action plans** are an opportunity to address upwind and downwind trans-boundary air pollution through inter-state and inter-department co-ordination.
Airshed management needs good science and regulatory framework

- Regional scale air quality monitoring strategy, pollution sources, and assessment of transboundary flows
  - Monitoring at the micro scale, neighbourhood scale, urban scale and regional scale to characterize regional air-quality trends, geographic patterns and regional background and transport of pollution.

- Delineation of air quality control regions: The scope of the Air Act, 1981: establish air quality control regions

- Leverage state action plans to establish shared responsibility to account for contribution to air quality in downwind regions within the state

- Need oversight for multi-jurisdiction action in the targeted regions
  - Establish a formal collaborative and integrated process for regional harmonization of action plans
  - Adequate financial support, resource mobilization strategies and capacity building.

Need new generation agenda for a scalable clean air action
Regional approach can improve implementation in smaller towns, rural areas

- **Complex solutions** (institutional arrangement, scale of infrastructure development, enforcement and compliance framework) designed for mega and big cities may not be directly applicable to smaller cities/towns.

- Smaller towns are experiencing **difficulties in utilizing the funds** and implementing multi-sector actions.

- **For smaller towns,**
  - Planning require **local, cluster-based** and **asset sharing** solutions - for infrastructure development for waste management and recycling, public transport strategies, etc.
  - **Infrastructure deployment** for clusters of towns instead of individual towns. The same facility should be able to cater to the needs of several small towns efficiently.

- **Regional approaches** can address pollution in smaller towns and rural areas.
National policies need to get stronger to support and enable local action in cities and states

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

- Local level planning for local pollution sources can be done at city and regional level

- Industrial pollution control, power plant pollution, public transport infrastructure depend on state and central government interventions

- For instance,
  - State governments have issued approved fuel lists. This requires central government intervention for development and financing of fuel infrastructure as well as fuel pricing policy, it cannot be addressed at city level.
  
  - Cities aiming to improve transit infrastructure and achieve multi-modal integration need Central government rules and support.
  
  - Several city action plans require implementation of remote sensing measurements for on road emissions monitoring. But this cannot be taken forward unless MoRTH notifies the rules.

- Need strong interface between national and state action
Need sustainable funding strategy at central and state levels for sustained and scalable action

- **Year-wise budget forecasts** for ongoing and new schemes at least up to 2030 needed
- **Enhance sectoral funding strategies** for streamlined action on clean technologies, fuels, green infrastructure and urban design solutions etc.

- Need to strengthen **convergence with central schemes**
  - Ensure integration of relevant indicators into central schemes
  - Implement targeted subsidy programs to scale up clean technologies, fuels and green infrastructure
  - Address affordability and equity issues
  - Introduce robust market-based mechanisms in the industry sector
  - Innovate fiscal strategies to support environmental goals effectively

- Implement **polluter pay principles** for designing taxes, pricing policy and cess for additional revenue to create dedicated funds for targeted action.
  - This approach has the potential to generate substantial funds that can be used to drive behavior change and fund specific initiatives.

- **Green municipal bonds** can be explored as a funding opportunity.
  - 11 cities, including Ahmedabad, Surat, Visakhapatnam and Pune have already issued Municipal Bonds. Ghaziabad using funds from green municipal bonds for wastewater recycling.
New “Challenge fund” under discussion to prioritize action in key sectors

- The proposed Challenge fund needs to identify-
  - **Priority action** across key sectors of pollution
  - **Develop a funding and compliance framework** for implementation
  - Focus on addressing pollution challenges at both city and regional scales.

- The next phase of funding under Challenge fund has to ensure:
  - Massive clean energy transition in industry
  - Massive cleaning up of vehicle fleet by phasing out targeted end-of-life vehicles
  - Electrification of vehicles at a scale for zero emissions transition
  - Scale up integrated public transport
  - Eliminate solid fuels for cooking
  - Targets of 100 per cent collection and segregation of waste
  - Remediation of legacy waste in dumpsites diversion of fresh waste from dumpsites

- In the next phase of funding:
  - Shift focus towards implementation of priority actions in key sectors of pollution at a scale
  - Link the performance based funding with achievement of specific sectoral goals
Need measurable improvement

• Adopt protocol for data recording and reporting for each indicator – process and outcome;

• Adoption of Programme Monitoring Strategy for tracking compliance against targets, detailed standard operating procedure (SOP) and management information system (MIS) within each department.

• Leverage smart monitoring and digitisation for transparent monitoring and policy feedback.

• Strengthen institutional, regulatory and technical capacity of the departments to enable planning and implementation.

• Integration of sectoral policies and regulations that provide the mandate, regulatory standards, compliance strategy, and deterrence framework with clean air outcome.

• Need protocol for data recording and reporting on the indicators

• Several CPCB indicators require data reporting on enforcement and penal action in different sectors – not aligned
Need protocol for data recording and reporting on the indicators

- ULBs and SPCBs face problems in collating information from all departments and then uploading the information on the PRANA portal.

- Departments face difficulty for how to track and maintain the data set and use that for reporting purposes.

- Not having any protocol for departmental and inter-departmental flow of information.

- Departments should be 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.

- Departmental and inter-departmental flow of information (both quantitative and qualitative) for regular reporting will eventually require an automated dashboard at the city level.

- Effective mechanisms and cooperation between the relevant authorities are required for data accessibility and for the cities to meet deadlines when conducting various investigations.

- 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.
Need transparency to promote best practices to build the learning curve for other cities

- Under NCAP, current system of ranking and scoring cities, an opportunity to capture the details of the sectoral good practices in different cities

- Best practices can present a learning curve for others on the quality and scale of action and the direction of change needed to make a difference

- It provides insights into the direction of change required for impactful results

- As a policy, it is crucial to adopt a best-practice approach when designing implementation strategies in sectors to ensure impactful change.
Lasting reminder....
Cities need massive reduction in PM2.5 levels (2023)

Note: Data completeness criteria used in the analysis is: Minimum 45 days of valid 24hr average in each quarter of the year. If any station fails to meet 45 days of valid 24hr average even in one of the four quarters then it is not considered for computing annual average, doesn't matter it has more than 180 days of data in total for the year. This is done to ensure symmetry across the seasons. It is in line with data completeness rules of USEPA. Annual average is computed as mean of quarterly averages as per USEPA formula.

Source: CSE analysis of CPCB realtime data
Learn from Delhi’s tough battle

Vehicles
- Direct leapfrog from BS IV fuel and vehicle emission standards to BS VI
- Diesel fueled vehicles disincentivized – price differential between petrol and diesel reduced; Age limit set on vehicles
- Truck traffic entry disincentivized -- pollution tax and cashless payment of ECC; expressways to bypass traffic.
- **Indicative energy transition:** – 46% drop in HSD diesel consumption between 2014-2023
- Share of diesel cars dropped from 35% in 2015 to 7.2% in 2023

Thermal power plants
- All coal based power plants in Delhi shut permanently
- Coal based power plants in NCR region – temporary closure during winter

Industry
- Pet coke and furnace oil use banned; Pet coke imports banned
- All coal use in Delhi has been banned, including for industrial operations – natural gas use expanded; NOx and SOx standards set for all industries

*Indicative change in NCR: Substantial migration to biomass and natural gas replacing coal in industry -- needs assessment*

Ongoing action on construction activities; Waste; Hotspot action; Area sources
Challenging pollution curve – a long way to go

Note: Data from following CAAQM stations from where continuous data is available: Anand Vihar, CRRI Mathura Road, DTU, IGI Airport, IHBAS, ITO, Mandir Marg, NSIT Dwarka, North Campus DU, Punjabi Bagh, RK Puram, and Shadipur. – Based on data from 12 stations

* Data uptill 28 Nov 2021. 3-year averages are calculated using USEPA methodology and data completeness requirement, with median value substitution for missing data.

Source: CSE analysis of CPCB’s realtime data
New NCAP agenda has to accelerate harmonised and scalable solutions across all regions

Vehicle technology and fuel quality

• **Emissions standard** is the common minimum requirement for all 
• **Fleet renewal and scrappage policy** for end-of-life vehicles – special focus on heavy duty vehicles (National policy – need state action) 
• **Targeted scaling up of electrification of vehicle fleet** (National scheme and state policies)

Mobility transition

• Integrated public transport; walking and cycling infrastructure 
• Vehicle restraint measures – parking policy, low emissions zones, tax measures

Clean energy and technology transition in industry

• **Clean energy access** – address pricing and infrastructure 
• **Affordable clean fuel and emissions control approaches for MSMEs** – scalable state level schemes possible for **boilers, furnaces, brick kilns, locally significant industry clusters** (mineral grinding, metal work etc) 
• **TPP emissions standards; retirement of old plants; fly ash management**

Addressing solid fuels in households

Address are sources and greening
Thank you