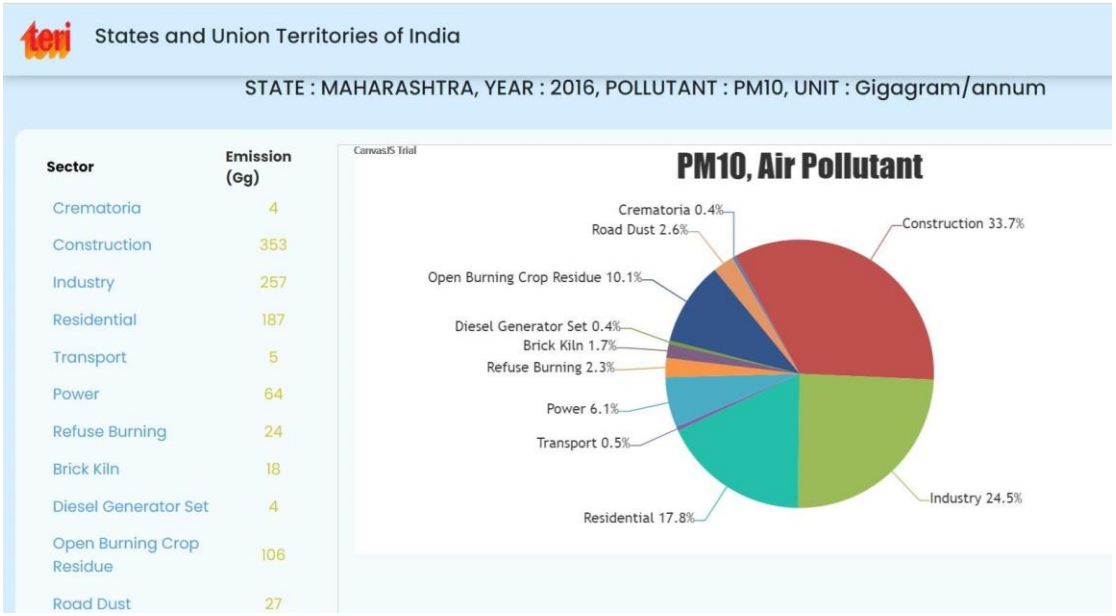
Introduction

A new digital platform, Maharashtra City Action Plan Dashboard, released by the NCAP Tracker, is a first-ever digitisation of the complete city action plans for 17 non-attainment cities and Vasai-Virar in Maharashtra, the plan for Jalgaon could not be deciphered clearly and had to be left out of this exercise. City Action Plans are submitted to State Pollution Control Boards by non-attainment cities which come under the purview of the National Clean Air Programme (NCAP), and are strategies for local air pollution management.

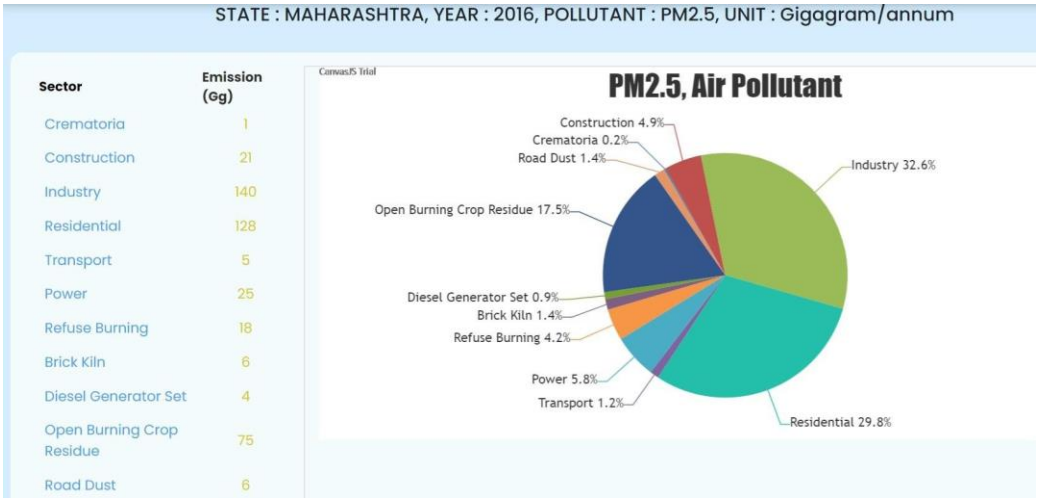
A mismatch between sources and action

Across the 18 clean air action plans from cities in Maharashtra, there are 314 measures - the maximum for any source - which focus on reducing vehicular emissions in the state. These actions are 'estimated to cost' Rs 17 thousand crore. However, based on TERI's emission inventory for the state, transport contributes to 1.2% and 0.5% of the total PM 2.5 and PM 10 emissions respectively.

On the other hand, household emissions find a mention only in 22 measures across 18 cities and require only Rs 28,000 to mitigate. Based on TERI's assessment, the contribution of household or residential emissions in Maharashtra's PM 10 and PM 2.5 pie is 17.8% and 29.8% respectively. For each action, the plans have stated an estimate of financial resources they estimate will be required. In the dashboard, it has been categorised as "requested finance." The total finances requested for each city or pollution source on the dashboard is an estimate as some actions in the plans list per unit costs and may or may not have defined the number of units.



Source: TERI



Source: TERI

The two other sectors where clean air action plans have listed most actions - 139 and 108 - are industry and dust resuspension respectively. According to the same TERI estimate, industry makes up 24.5% of the PM 10 emissions and 32.6% of the PM 2.5 emissions while road dust is 2.6% and 1.4% of the PM10 and PM2.5 emissions pie respectively.

However, city level sources vary drastically. For instance, vehicles are a source of 30% emissions in the NCAP cities of Maharashtra as shown below.

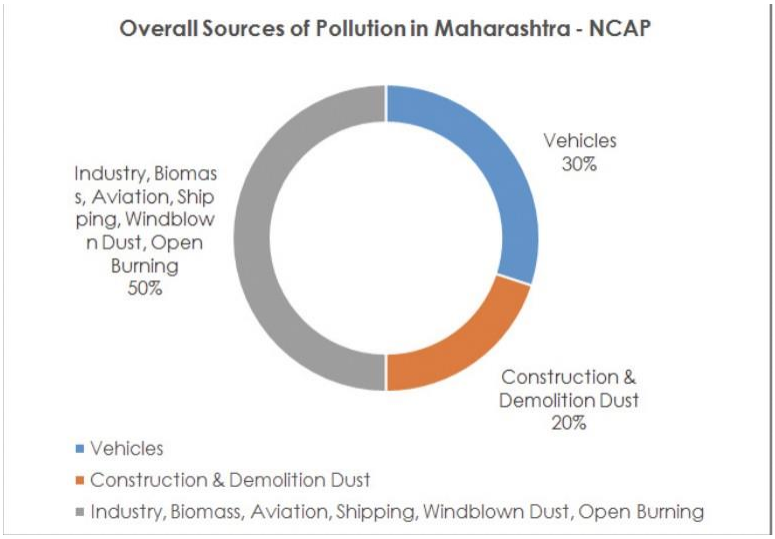


Image: Overall sources of fiollution in Maharashtra according to NCAP

Share of pollutants varies within cities as well. For instance, according to SAFAR's emission inventory, the most dominating source of PM2.5 is transportation whose share is found to be 31% in Mumbai. However, according to the 'Emission Inventory and Source Apportionment Study for Mumbai' by the National Environmental Engineering Research Institute (NEERI), vehicles contributed to about 4% of the PM concentration in the city. Twenty-one of Mumbai's 59 actions aim to tackle vehicular pollution. However the mismatch is more stark in other cities. According to the Amravati clean air action plan, industries contribute to 29% of the PM concentration in the city but none of the 28 measures touch on the sector. Meanwhile Chandrapur, an industrial hotspot with coal mines and heavy industries like thermal power plants, cement and sponge iron has 12 out of 35 action plans for managing industrial emissions, however it has not detailed any budget requirements to fund these plans unlike other cities.

A recent study by CEEW pointed out the need to develop and maintain a comprehensive inventory of baseline emissions as e isting estimates for India's emissions vary by up to 37% with significant variations in sectoral estimates.

What are control options and actions in the dashboard?

The actionable insights in the city action plans are broadly categorised under "control options" and "actions". Control options allow parsing or searching of the city action plans based on broad category terms such as "awareness campaigns" or "electric vehicles" or "road design", etc. The "actions" within these control options specify the e act "action" that is planned to be taken to mitigate the identified source of pollution. Analysis and access to

the city actions plans in this format allows for an unprecedented way to search and build insights into the action plans which form the basis of the government spending of the National Clean Air Programme budget allocated to these 17 cities.

How do the action plans define impact and timelines?

All the city action plans categorize the control options into high, medium or low impact without a definition, measure or uniformity. For instance, black topping of roads is expected to have a 'high impact' in Pune but 'low impact' in Solapur. Similarly, implementation timelines of short, mid and long term are not defined either. Use of LPG in Hotels and "dhabas" is listed as a 'long term' control option in Vasai-Virar but a 'short term' action in Thane and Navi Mumbai and 'mid term' in Amravati.

How strong are the action plans across sectors and cities?

Across cities and action plans, the top three sectors that find a mention in measures are vehicular emissions with 314 action points, followed by industries and dust resuspension with 152 and 122 action points respectively.

- **Vehicular emissions** - The actions proposed to tackle vehicular emissions range from checking PUCs, building awareness among citizens, retrofitting for BSVI or BSV fuel, intelligent tra c systems, road widening to building highways. Introduction of electric vehicles makes an appearance in 17 city action plans with cities like Pune estimating the need of Rs 750 crore to buy 500 electric buses, Nashik requesting Rs 100 crore for its electric bus fleet, Thane planning for 100 e-buses and charging stations, and Navi Mumbai aiming for 30 e-buses along with charging stations for three and four wheelers. Cities like Jalna, Aurangabad and Latur mention electric/hybrid vehicles as an action point without further details, while Sangli, Ulhasnagar and Badlapur discuss it under e-rickshaws lacking clarity on how these plans will be implemented. Infrastructure projects also feature as an action point with cities such as Mumbai estimating to spend Rs 12500 Crore to build the coastal road and Rs 906 crore on road widening projects to address vehicular emissions from tra c jams. Both Pune and Mumbai have listed their Metro and Mono Rail projects as an action point to reduce vehicular emissions.

  These actions however are now enhanced with the state's electric vehicles policy released in June 2021 by the environment ministry which plans to "aggressively target (the) state's five Urban Agglomerations (with a high share of PM2.5 emissions) to become lighthouse regions in EV adoption". These 5 cities from Maharashtra --

Greater Mumbai, Pune, Nagpur, Nashik, and Aurangabad -- are among the list of 42 across India which were identified by the XV Finance Commission to undertake air pollution control measures and allotted funds from the Union Budget 2021. The state EV policy targets 25% electrification of public transport and last-mile delivery vehicles by 2025 in these 5 cities. By 2025, the state plans to set up city-wise public and semi-public charging stations in Mumbai (1500), Pune (500), Nagpur (150), Nashik (100), Aurangabad (75), Amravati (30) and Solapur (20). For cities like Thane, Navi Mumbai, the policy envisages additional resource mobilization (over and above NCAP/FCC funds) from various schemes and programmes of central/state governments and Urban Local Bodies for funding the charging infrastructure.

- **Industry emissions** - 17 cities have proposed 139 action plans and have requested finance of Rs 515 crore to manage industrial emissions. These cities include Navi Mumbai (16 action plans), Thane (11), Vasai Virar (11), Chandrapur (12), Solapur (8), Pune (1), Kolhapur (7), Aurangabad (5), Mumbai (11), Nashik (4), Sangli (10), Ulhasnagar (5), Badlapur (14), Akola (3), Jalna (4), Latur (5), and Nagpur (12). The Maharashtra Pollution Control Board is the implementing agency for most of the measures listed under the city clean air action plans to reduce industry emissions. Owing to its industrial nature, Navi Mumbai has the highest - 16 action points listed as measures proposed to reduce industry emissions. However, most of these measures have not been coupled with finance requests from cities, except Rs 1 lakh for an air pollution control system in stone crushers and Rs 3 crore for creating a buIer zone and maintenance of roads for mining areas, both in Navi Mumbai. With only food processing units, assembling plants and majorly software IT parks located in the Pune municipality limits, measures to reduce industry emissions don't find a mention on the city's action plan. However, its neighbouring Pimpri-Chinchwad region has many polluting industries and that hasn't been taken into consideration. Chandrapur has dedicated 12 out of 35 actions to industries which require power plants to use high quality coal, closed trucks for coal transportation and an air quality prediction system based on real term emission. Currently, despite the presence of thermal power plants in Chandrapur, data from NCAP Tracker, which sources levels from CPCB's CAAQMS network shows that except for the winter season, the monthly average PM 2.5 concentration in the city is well within the CPCB safe limits of 40 ug/m3.

  According to the 2018 Comprehensive Environmental Pollution Index (CEPI) air assessment score that depicts the air quality in industrial regions, Maharashtra with seven critically polluted industrial regions - Chandrapur, Tarapur, Dombivalli, Nashik, Navi-Mumbai, Chembur and Pimpri-Chinchwad -is second only to Uttar

Pradesh in the national ranking. While industrial emissions are clubbed with windblown dust, open burning and biomass, together they form 50% of the overall source for air pollution in Maharashtra according to the National Clean Air Programme (refer to image below). According to a report by Climate Trends

- Maharashtra has over 100,000 industries spread over several industrial complexes and industrial clusters;
- Out of these, 23,500 industries have been identified as those with high pollution potential and 25,500 with medium pollution potential;
- Cement industry has benefitted from multiple easing of emissions norms and extension of deadlines for compliance;
- Several mega infrastructure projects and land banks for industry are under development leading to further energy and land-use related emissions.

A report by the MoEF&CC revealed that Nanded, Dombivali, Ambernath, Badlapur, Ulhasnagar, Thane, Bhiwandi, Pimpri-Chinchwad and Pune are the most polluted industrial towns and cities with the highest levels of SO_2 and NO_2. However, many of these regions do not feature in the state's air pollution management plans.

- **Dust resuspension -** Dust resuspension finds a mention 108 times across the action plans and the requested budget of Rs 4,000 crore is only second to vehicular emission by 18 cities. Akola leads with maximum number of measures for resuspended dust management amongst cities, followed by Navi Mumbai and Sangli at 9 -- Nagpur (7), Latur (4), Jalna (4), Navi Mumbai (10), Thane (7), Vasai Virar (6), Amravati (3), Chandrapur (2), Solapur (6), Pune (7), Kolhapur (3), Aurangabad (3), Mumbai (7), Nashik (5), Sangli (9), Ulhasnagar (4) and Badlapur (7).

  Some of the major measures all cities plan to undertake are maintaining pothole free roads, green buIers or water fountains along tra c corridors and junctions, black topping of roads and tree plantation drives. Mumbai's action plan has also proposed installation of 25 WAYU (Wind Augmentation and Purifying Units) at urban tra c intersections.

Problems of compliance?

The analysis of the action plans on the dashboard shows that apart from the Maharashtra Pollution Control Board and the Urban Local Bodies several others like the RTO, Petrochemical Authority, the Maharashtra State Road Development Corporation (MSRDC), City and Industrial Development Corporation (CIDCO), Agricultural Produce Market Committee (APMC) etc. are listed as implementing agencies for various action points.

However, analysis of the action plans on the dashboard bring forth how Maharashtra's action plans don't call for institutional and administrative coordination for tackling regional influences. A study by CEEW and Urban Emissions also pointed out that none of the plans have a legal mandate for implementation, 65% plans had not outlined financial requirements for actions proposed, 70% plans do not include crucial information on air pollution sources and there is no regional coordination mechanism.

While some measures in the action plans are proposed to remain ongoing, most others have an implementation deadline between 2019 and 2022. For instance, in the Mumbai clean air action plan - Improved Combustion technology is listed as a control option for industry with an implementation target of December 2019. A remark in the action plan said, "M/s. TATA power company installed and operated a state of art technology for coal handling i.e. screw conveyor which closed the pipeline system." But, maintaining pothole free roads to reduce dust in the city is a continuous activity with little ways to monitor and measure.

How have the Non-Attainment Cities performed over the last three years?

Data from the NCAP Tracker shows that out of nine of the state's 18 non-attainment cities which have Continuous Ambient Air Quality Monitoring Stations (CAAQMS), four cities - Mumbai, Chandrapur, Navi Mumbai and Solapur recorded an increase in PM 2.5 levels from 2019 to 2021. Similarly, Mumbai, Navi Mumbai and Aurangabad recorded an increase in PM 10 levels from 2019 to 2021. The NCAP requires non-attainment cities to bring down their PM levels by 20-30% by 2024, taking 2017 levels as the base year. There are no CAAQMS monitors in Akola, Amravati, Badlapur, Jalgaon, Jalna, Kolhapur, Latur, Ulhasnagar and Sangli. While these cities are not under the continuous monitoring purview, their action plans attribute pollution to road dust, vehicular emissions, industry and even coal power plants in some places.

City	Annual average PM 2.5 concentration			Annual average PM 10 concentration		
	2019	2020	2021	2019	2020	2021
Aurangabad	41	31	34	76	63	78
Chandrapur	37	30	40	88	71	84
Kalyan	37	46	55	99	116	124
Mumbai	35	42	45	83	96	102
Nagpur	43	29	33	80	55	67
Nashik	37	32	37	68	57	62
Navi Mumbai	39	55	51	90	108	120
Pune	48	48	40	87	77	68
Solapur	33	30	34	102	86	82
Thane	78	NA	NA	86	97	156

Source: NCAP Tracker

About NCAP Tracker

NCAP Tracker is a joint project by Climate Trends and Respirer Living Sciences to create an online hub for the latest updates on India's clean air policy, the National Clean Air Programme (NCAP). It is designed to track India's progress in achieving the 2024 clean air targets set under the NCAP. The NCAP Tracker enables this by compiling and evaluating various levels of air quality data and closely tracking the effectiveness of the clean air policy. The tracker compiles and analyses information on air quality and budget allocation that is publicly available or provided by the government of India.