Credits:

Chennai:

A pedestrian plaza with the aim of utilizing the additional road space to incorporate all essential pedestrian amenities besides creating a traffic-free social space has been developed at Sir Thyagaraya Nagar

by Chennai Smart City Corporation

5

Mobility and Air Quality

Mobility and Air Quality

The mobility requirements are bound to increase with the projected urbanization trend in cities and this entails increased CO_2 emissions, a key contributor to climate change. The SDG 11 acknowledges the role of sustainable urban transport in achieving targets of Paris Agreement. In India, 13% of CO_2 emissions is attributed to the transport sector and this is three times the emissions since 1990[1].Increasing CO_2 deteriorates the air quality and cities are beginning to experience its adverse impact, especially on human health. Cities and the urban residents are, thus, both contributors and victims of poor air quality. Focus on urban mobility can help address not only transport related challenges but also mitigate climate change and improve air quality paving the way for sustainable and resilient cities.

Cities are on the course of mobility transformation and central government policies and schemes such as the National Urban Transport Policy (NUTP) 2014, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Automotive Mission Plan 2026 and Faster Adoption and Manufacturing of Electric/Hybrid (FAME) India are supporting and guiding cities in the process. Under AMRUT, cities are improving non-motorized transport infrastructure like footpaths and walkways and developing infrastructure for Multimodal Integrated Transit (MRT) and Bus Rapid Transit System (BRTS). State departments are identifying gaps in infrastructure to approve funds for city-level schemes. While cities recognize the significance and need for efficient and sustainable transport systems, transitioning into low carbon mobility requires holistic planning and dedicated implementation.

Besides reducing CO_2 emissions from the transport sector, cities need to focus on improving their air quality. In order to understand this concern, cities need to monitor air quality regularly besides identifying the sources of pollution. With this information, cities can develop clean air action plans and further adopt sector specific actions to control air pollution. Improvements in air quality would have the dual benefits for cities to achieve sustainable development goals in mitigating climate change and improving the quality of lives.

Under this theme, cities are assessed on measures taken to transition towards low carbon mobility along with improving the coverage of public transport and infrastructure for non-motorized transport. Cities are also assessed based on the steps taken to monitor air quality and measures initiated towards developing clean air action plans and implementing some of the actions.

Dr. O.P. Agarwal
CEO
WRI India

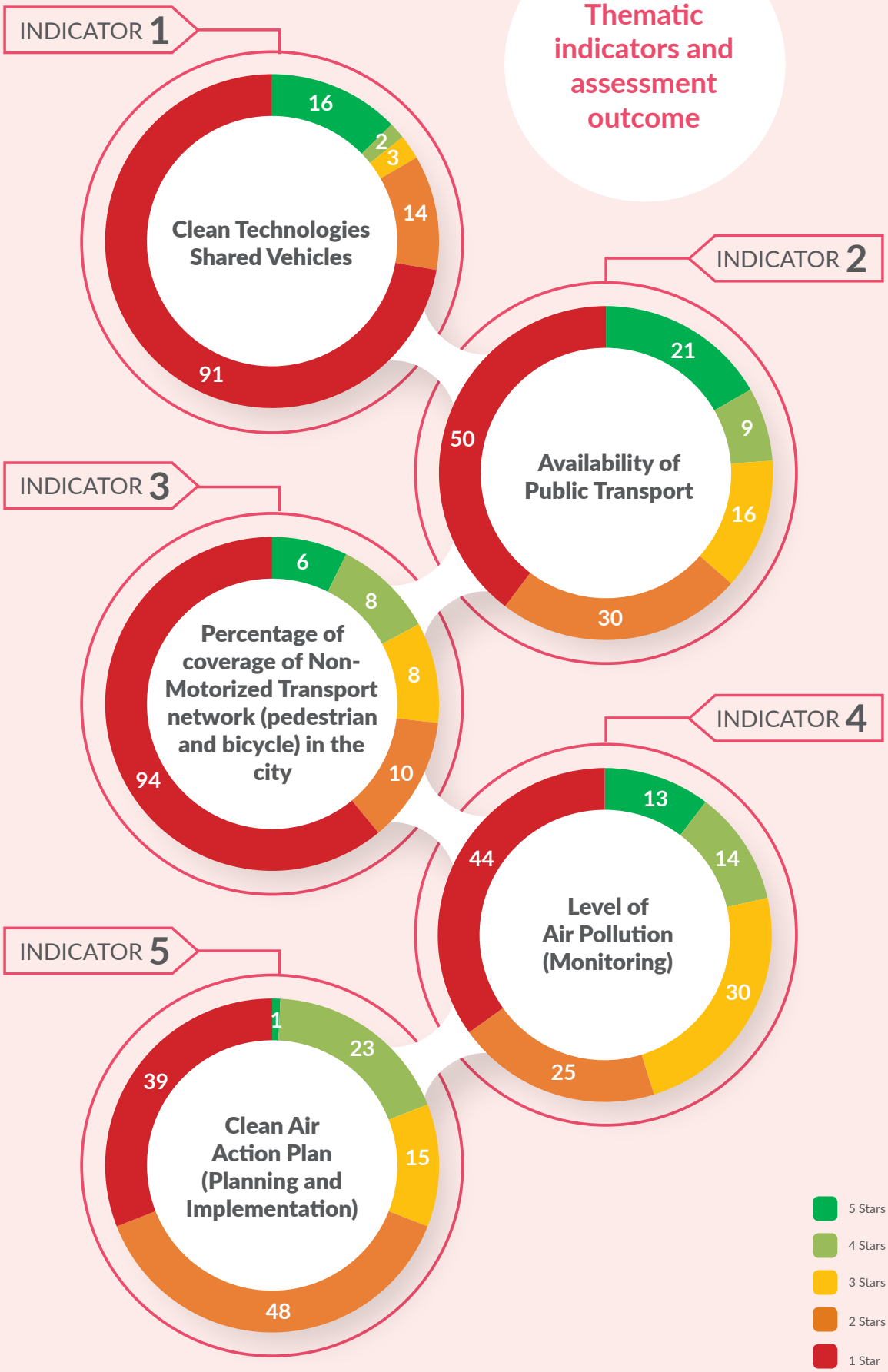
“As the world grapples with climate change, India’s growing cities will not only become significant contributors of GHG emissions but will also be adversely impacted by extreme weather events. India’s efforts at building future cities will, therefore, need to be climate conscious, inclusive and resilient.”

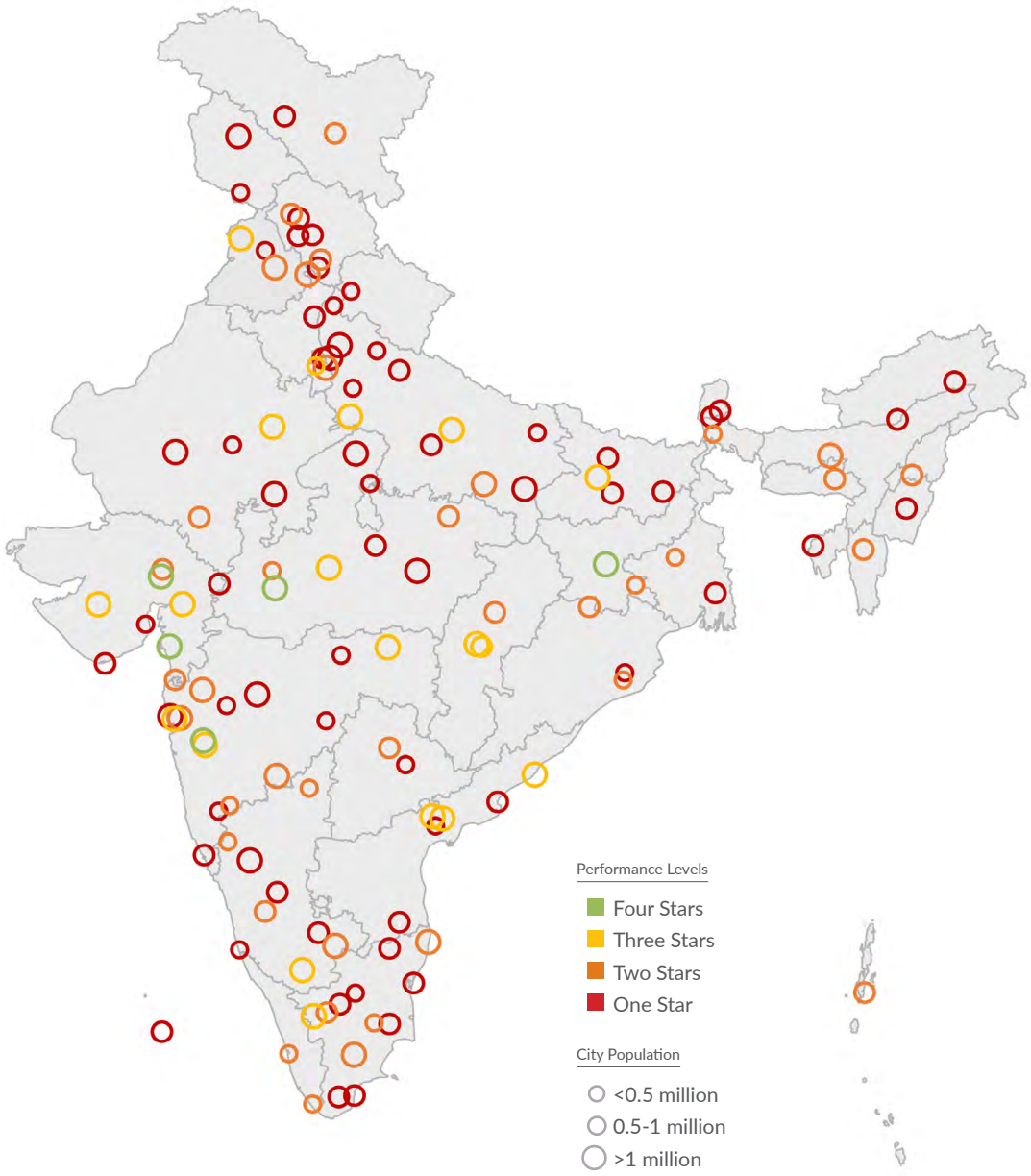
“CSCAF is an innovative program that integrates air quality within a climate framework, thus highlighting the co-benefit approach. It mainstreams addressing air pollution in the city development process, to drive data generation, communication, and mitigation activities for clean air. It sets an example of including air quality within a structured multi-year program that can track air quality management progress and highlight solutions.”

Ms. Prarthana Borah
India Director
Clean Air Asia

1. S, Ralph et. al, 2014. Transport. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter8.pdf[Accessed 31 March 2021]

Thematic indicators and assessment outcome





Performance of 126 Cities

5 cities have shown progress and are at *Four Stars* category. These are metropolitan cities which are actively leveraging Smart City Mission for their mobility needs.

Almost 50% of the participating cities (57 cities) are in *Two Stars* and *Three Stars* category. Among 64 *One Star* cities 25 cities are from the northern region of India.

Considering that the northern states have been facing severe air pollution for the past few years, it is crucial for cities from the states of UP, Rajasthan, Punjab and Delhi to take up more measures in this thematic area.

All the participating cities from hilly and cold climatic zones are either in *One Star* or*Two Stars* categories. Hilly terrain can be challenging in developing transport infrastructure. Further due to their terrain, these cities also lack adequate air quality monitoring sensors.

All participating small-towns in the assessment are in *One Star* and *Two Stars* categories. Lack of infrastructure and resources in these cities pose challenges in planning and implementing new technologies for improving transportation and monitoring air quality.

0	5 Stars
5	4 Stars
19	3 Stars
38	2 Stars
64	1 Star

★★★★

- **Ahmedabad**
- **Indore**
- **Pimpri Chinchwad**
- **Surat**
- **Ranchi**

★★★

- **Agra**
- Amravathi
- **Amritsar**
- **Bhopal**
- **Coimbatore**
- Gurugram
- **Jaipur**
- **Lucknow**
- Mysore
- **Nagpur**
- Naya Raipur
- **Patna**
- **Pune**
- **Raipur**
- **Rajkot**
- **Thane**
- **Vadodara**
- **Vijayawada**
- **Visakhapatnam**

★★

- Aizawl
- Belagavi
- **Bengaluru**
- Bhubaneshwar
- Bilaspur
- Chandigarh
- **Chennai**
- Dharamshala
- Durgapur
- **Faridabad**
- Gandhinagar
- Gulbarga
- Guwahati
- Jamshedpur
- **Kalyan Dombivali**
- Karimnagar
- Kochi
- Kohima
- Leh
- **Ludhiana**
- **Madurai**
- **Nashik**
- Port Blair
- **Prayagraj**
- Rourkela
- Sangli Miraj & Kupwad
- **Satna**
- Shillong
- Shimla
- Shivamogga
- Siliguri
- Silvassa
- Solapur
- Tiruchirapalli
- Tiruppur
- Tiruvanantapuram
- Udaipur
- **Ujjain**

★

- Agartala
- Ajmer
- Aligarh
- Amravati
- **Aurangabad**
- Barielly
- Bhagalpur
- Bhavnagar
- Bihar Sharif
- Cuttack
- Dahod
- Davangere
- Dehradun
- Delhi
- Diu
- Erode
- Gangtok
- **Ghaziabad**
- Gorakhpur
- Guntur
- **Gwalior**
- Hamirpur
- Hubli Dharwad
- Imphal
- Itanagar
- **Jabalpur**
- Jalandhar
- Jammu
- Jhansi
- **Jodhpur**
- Kakinada
- **Kanpur**
- Kargil
- Karnal
- Kavaratti
- Kolhapur
- **Kota**
- Loni
- Mandi
- Mangalore
- **Meerut**
- Mira Bhayandar
- Moradabad
- Muzaffarpur
- Namchi
- Nanded
- New Town Kolkata
- Palampur
- Panaji
- Pasighat
- Puducherry
- **Sagar**
- Saharanpur
- Salem
- Solan
- **Srinagar**
- Thanjavur
- Tirunelveli
- Tirupati
- Toothukudi
- Tumakuru
- **Varanasi**
- Vellore
- Warangal

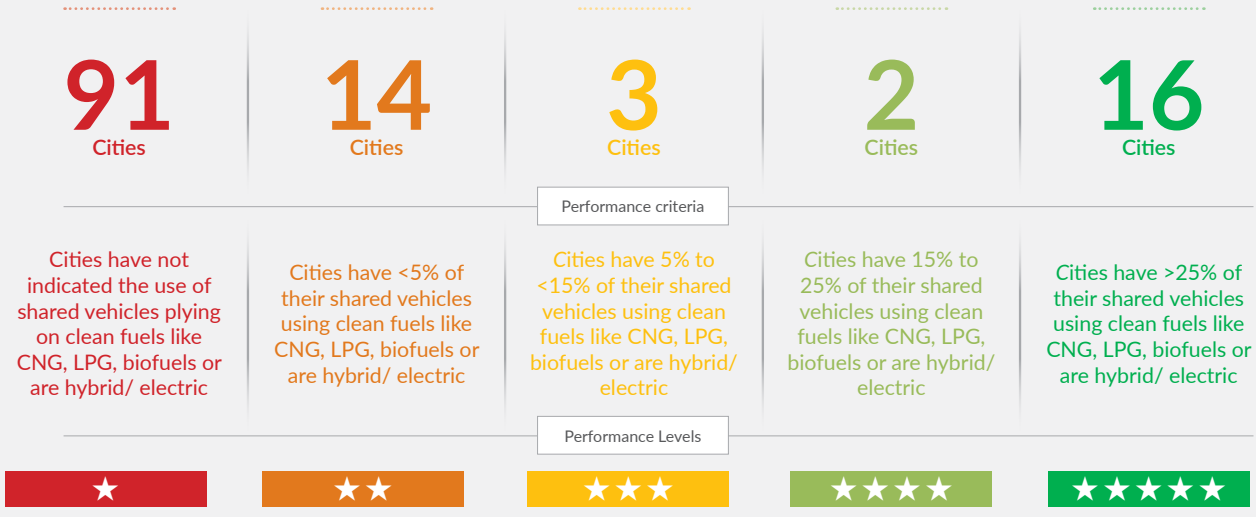
● Smart and AMRUT cities ◈ Smart cities ◆ AMRUT cities ○ Other cities *Million + population cities

INDICATOR 1

Clean Technologies Shared Vehicles

Transportation accounts for a significant proportion of energy-related CO_2 emissions globally. In Asian countries, a three-to-five-fold increase of transport related CO_2 is expected by 2030 compared to emissions in 2000[2]. Increasing urbanization coupled with inadequate public transport and increased affordability and aspiration of citizens has led to a tremendous increase in number of motor vehicles plying on Indian roads where the growth in ownership per 1,000 population has increased from 53 in 2001 to 167 in 2015[3]. This is not only contributing to global warming but also deteriorating air quality in cities. Hence, there is a need to reduce dependence on private vehicles. With many cities still working on providing public transport options like buses and metros, shared vehicles like app-based taxis and autos have emerged as an alternative mode. The ease and comfort of availing these services is contributing to a modal shift especially among private car owners. If this is done in coherence with switching to low carbon fuels like electricity and CNG, it will be significantly successful in reducing GHG emission of transport sector.

The central government is taking various initiatives to switch to cleaner fuels and to reduce emissions, namely, the implementation of Bharat Stage-VI norms from April 2020, promotion of electric/hybrid vehicles through National Electric Mobility Mission Plan 2020 and Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME), and introduction of cleaner / alternate fuels such as LPG,



Performance of 126 cities

- ✓ Only 35 of the 126 participating cities have reported all the requisite details for this indicator. Among them, 32 cities have provided partial data on the use of clean technology buses, taxis and/or e-rickshaws. The evidences for this indicator had to be collected from external authorities including Roads and Transport Authority (RTA) and licensing agencies. Coordination between departments and agencies outside the purview of Municipal Corporations and ULBs during the pandemic situation was cited as one of the key challenge by the cities.
- ✓ Among the 35 cities that have reported on this indicator, 22 are metropolitan, 7 are large cities and 6 are medium sized cities. Based on the results of the evaluation, 15 metropolitan, 1 large city and 2 medium sized cities have performed well and are in the *Five Stars* and *Four Stars* category. None of the participating small towns have reported on this indicator.
- ✓ Among all categories of shared vehicles, 59 cities have been able to report on the availability of low carbon autos and e-rickshaws indicating high penetration of such transport options.

Actions

KOCHI

Under the Integrated Sustainable Urban Transport Systems for Smart Cities (SMART-SUT) project, Kochi has prepared for pilot of 100 e-autos with lithium-ion batteries including options for a viable business model, demand analysis, technology selection, cost estimates and supporting infrastructure. Pilot areas are Fort Kochi, Kadavanthara and Elamkulam and is intended to lead to upscaling to other parts of the city.

CNG, Bio-Diesel Blends, Battery Operated, Hydrogen and Solar Operated vehicles. These measures, in addition to availability of renewable energy, skilled manpower and technology, infrastructure transition and culture to accept the sharing of assets have created an opportunity in India for accelerated adoption of cleaner technologies over convention fuel vehicles enabling a conducive environment for sustainable mobility paradigm[4]. To successfully attain this transition, it will also be important to strengthen the fragmented institutional framework as well as increase cleaner fuel infrastructure like EV charging stations, CNG/ Biofuel stations etc. along with increasing availability of vehicles running on cleaner fuels/technologies.

The indicator on Clean Technologies Shared Vehicles assesses the cities based on the percentage of clean technology shared vehicles adoption. The clean technologies shared vehicles included in this assessment are buses, taxies, app- based cabs, app based two wheelers, autos, e-rickshaws, private buses and ferries consuming fuel types like - CNG/ LPG/ Hybrid/ Biofuels/ Electric.

Way forward to transition towards low carbon shared mobility

- Cities are suggested to initiate a step-by-step process for procuring low carbon vehicles, installing required infrastructure and developing plans for a phased mobility transition. Cities which are part of the Faster Adoption and Manufacturing of Electric Vehicles in India (FAME) phase-II scheme can procure electric buses. The NITI Ayog guidelines on shared mobility may be referred for enhanced actions.
- Cities can promote CNG paratransit (especially autorickshaws) and buses and incentivize the use of low carbon vehicles. To build infrastructure for clean technology vehicles, cities can refer to the guidelines developed by the Ministry of Petroleum and Natural Gas or setting up CNG stations.
- Cities are recommended to strategize the deployment of shared vehicles including buses, metros, trains, and leverage shared vehicles such as Ola, Uber, Shuttl, Bykerr and other ride sharing services. They can sensitize citizens to adopt ride splitting such as carpooling, car and bike sharing, and use of micro transit when possible. Such efforts can lead to the dual benefit of reduced emissions and fuel consumption in addition to creating employment opportunities.

Ms. Prerna Mehta
Associate Director
WRI India

“Sectoral contributions are critical for advancing climate change discourse in cities. Addressing the mobility sector is particularly crucial as it is one of the highest contributors of GHG emissions in India. Measuring climate conscious actions of this sector, through CSCAF, will boost climate action and enable cities to meet their targets.”

2. Asian Development Bank, 2010. Reducing Carbon Emissions from Transport Projects. Evaluation study. Available at: https://www.oecd.org/derec/adb/47170274.pdf[Accessed 31 March 2021]
3. Shakti Sustainable Energy Foundation , n.d. Fuel Efficiency Norms in India. [Online] Available at: https://shaktifoundation.in/work/transport/fuel-efficiency-norms-in-india/[Accessed March 2021].
4. NITI Aayog & World Energy Council, 2018. ZERO EMISSION VEHICLES (ZEVs) : TOWARDS A POLICY FRAMEWORK, NITI Aayog.

INDICATOR 2

Availability of Public Transport

European and North American cities have witnessed a reduction trend of car share over the years. Whereas, rapid urbanization in Asia has pushed its car share to 40% of global usage, which 1.5 times the 2015 level[5]. The annual growth rate of motor vehicle numbers in India has been about 10% during the last decade. It is important to note that 32% of these vehicles are plying in metropolitan cities alone, which constitute about only 11% of the total population[6]. This is resulting in increased GHG emissions, traffic congestion, increased travel times and poor air quality in the cities. A switch to efficient, affordable and convenient public transport is the need of the hour.

In India, only 17 cities have operational city bus services, 12 cities have rail transit option and 18 cities have operational metro systems with 1,016 km of Metro and Regional Rapid Transit System lines under construction in 27 cities[7]. Seeing the need, the government is actively promoting and investing in the public transport sector with Rs.18,000 crores allocated in the 2021-22 budget for public bus service augmentation. In addition, 'MetroLite' and 'MetroNeo' will be deployed to provide metro rail systems at much lesser cost with the same experience, convenience and safety in Tier-2 cities and peripheral areas of Tier-1 cities.[8] Over the last two decades, the national, state and

Performance of 126 cities

- ✓ 21 cities from the states of Bihar, Chhattisgarh, Himachal Pradesh, Karnataka, Maharashtra and Tamil Nadu managed to provide adequate public transportation data and have advanced to the level of *Five Stars* in this indicator.
- ✓ 110 of the 126 participating cities have indicated the availability of public transport. However, only 76 cities have managed to provide all requisite data.
- ✓ 37 of 50 metropolises, 12 of 34 large cities, 24 of 33 medium sized cities, 3 of 9 participating small towns were able to report on this indicator. A major gap is evident among the large and medium cities where over 60 percent of the participating cities have not been able to report on the availability of public transport.
- ✓ 76 cities have reported on availability of bus service, 5 cities have indicated the availability of metros, 4 cities on the availability of suburban rail and 2 cities have reported on the availability of ferries. Although metro services are available in many cities and ferries are available in many coastal and river dependent cities, coordination between multiple transport departments was cited as the key reason for cities not securing the required evidences. With respect to data on use of ferries, lack or absence of documentation owing to informal services is a challenge.
- ✓ As per MoHUA, the ideal service level benchmark (SLB) for the availability of public transport per 1,000 persons is >=0.6. From this analysis, it was evident that only 10 of 50 metropolitan cities, 1 of 34 large city, 8 of 33 medium cities and 2 of 9 small towns satisfy the SLB criteria. It was also evident that more percentage of medium sized cities have adequate fleet size of buses compared to large or metropolitan cities.

Actions

AMRITSAR

Amritsar has a 31 km BRTS corridor which has improved commuter conditions to a large extent. To further improve public transportation modal share and improve last mile connectivity, the city is implementing a range of sustainable mobility measures under the CITIIS (City Investments to Innovate, Integrate and Sustain) program. It includes provision of e-mobility options and feeder network to the BRTS corridor, enhancing EV charging infrastructure and provision of common smart card.

city governments have been driving the provision of bus and rail-based mass transit systems through organized and well-planned models. The Jawaharlal Nehru Urban Renewal Mission (JNNURM), launched in 2005, made provisions for buses and has sanctioned over 23 lakh buses across 141 cities.The National Urban Transport Policy, revised in 2014, have indicated the benefit of metro rail system for cities with over 20 lakh population. The recently launched Green Urban Mobility Scheme envisages 1,300 km of BRT in 28 cities supporting better management of bus transport.

While a range of policies and projects are being implemented, it will also be crucial to address the institutional and operational challenges of public transport expansion. Various agencies involved in the urban transport sector needs to be brought under a single ambit for increased efficiency and accountability. Besides this, dynamic data collection through urban analytics and transport modelling, improving public transport infrastructure and last mile connectivity will be required.

The indicator on Public Transport assesses cities based on availability of public transport per 1000 population.The availability is measured as fleet size of buses, metro coaches, suburban rail coaches and ferries which is converted to a comparable standard unit called Public Transport Unit (PTU). Refer Annexure 2 for details on population.

Way forward for expanding public transport

- Based on the demand as per transportation assessments and comprehensive traffic and transportation studies, cities can invest in increasing the fleet size of public transportation. Cities can explore PPP models for increasing the fleet size of buses and MoHUA's guidelines on city bus operations can be referred for the same.
- In case of lack of demand, cities can improve efficiency, route rationalization, schedules and last mile connectivity to attract people to shift to public transport. Campaigns for sensitizing people to use public transport can also be conducted.
- In order to understand the usage of public transport, cities can develop a digital transportation database for documenting data regarding ridership, modal share, networks and fleet size of different modes of public transportation on a monthly basis. With this information cities can understand the supply and demand and take appropriate actions. Cities can develop or revise their comprehensive mobility plan to address the need.

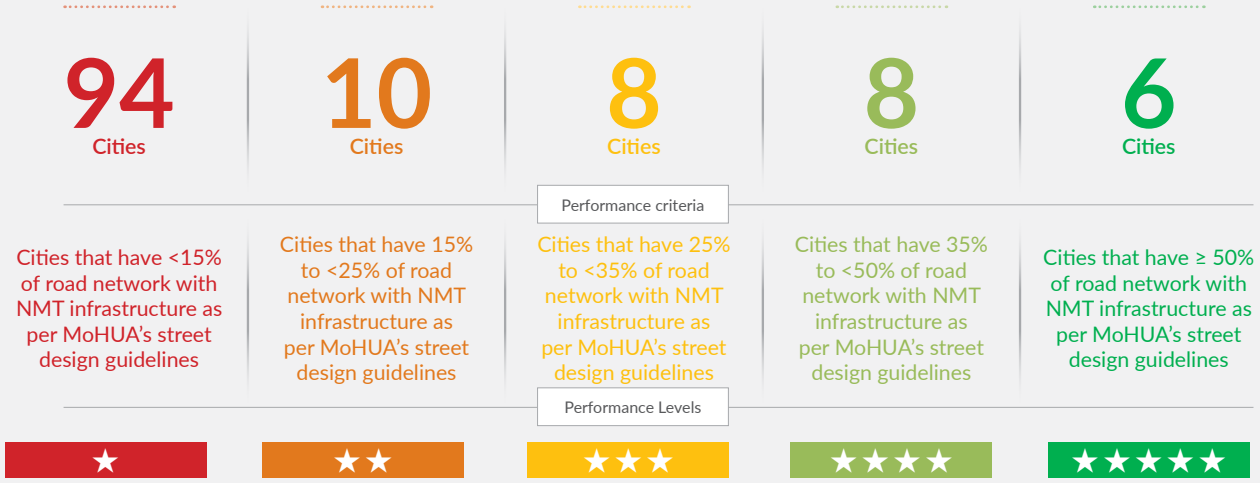
5. International Transport Forum, 2017. Chapter 5, Mobility in cities, ITF Transport Outlook 2017. OECD. [Online] Available at: https://www.oecd-ilibrary.org/sites/9789282108000-8-en/index.html?itemId=/content/component/9789282108000-8-en[Accessed 31 March 2021]
6. Singh, S, 2005. Review of Urban Transportation in India. Journal of Public Transportation, 8(1), 79-97. DOI:http://doi.org/10.5038/2375-0901.8.1.5
7. The Hindu, 2 February 2021. Public Bus Scheme, Expansion of Metros. Union Budget 2021.New Delhi. [Online] Available at: https://www.thehindu.com/business/budget/union-budget-2021-public-bus-scheme-expansion-of-metros/article33722572.ece [Accessed 31 March 2021]
8. The Hindu, 2 Februrary 2021. Union Budget 2021 | Public bus scheme, expansion of Metros. [Online] Available at: https://www.thehindu.com/business/budget/union-budget-2021-public-bus-scheme-expansion-of-metros/article33722572.ece [Accessed March 2021].

INDICATOR 3

Percentage of coverage of Non-Motorized Transport (NMT) network (pedestrian and bicycle) in the city

Non-motorised Transportation (NMT) includes walking and bicycling, and variants such as small-wheeled transport (cycle rickshaws, skates, skateboards, push scooters and hand carts) and wheelchair travel[9]. NMT does not emit GHG, nor local air pollutants. Every increase in NMT therefore leads to a direct decrease in GHG emissions and also contributes to SDGs 11 sustainable cities and communities especially for promotion of inclusive public transport. A recent study conducted by the World Health Organization on global road safety concluded that only 68 countries (out of 195 countries) in the world have national or local level policies that promote walking and cycling[10]. Traditionally, Asian cities have been characterized by short distance non-motorized transport trips. But this scenario is rapidly changing as cities in Asia are getting increasingly motorized with limited attention to NMT facilities, extreme heat and cold conditions and poor road safetyleading to a decrease in the overall NMT trip mode share.

In India, around 50% of the population commute by foot or by cycle/cycle rickshaw. A 2008 study of 30 Indian cities found that in cities with more than 8 million population: 22% walked all the way, 8% used cycles and 44% used public transport. This adds up to 74% of people who rely on non-motorized transport for at least part of the commute.[11] During the pandemic, India witnessed bicycle sales multiply, with nearly five million cycles sold between May and September 2020[12].Despite having a high share, most Indian roads are unsafe for walking and cycling. Although only 25% of trips are made using private vehicles there is 75% dedicated road space The Central Government has been actively addressing this concern through various policies and schemes. The National Urban Transport Policy (NUTP) of 2006, envisions a new planning paradigm which recognizes that, "people occupy center-stage in cities and all plans should be for their common benefit and well-being". The Code of Practice for Urban Roads developed by MoHUA through updating on the IRC (Indian Roads



Performance of 126 cities

- ✓ 86 of 126 participating cities have provided all requisite data for this indicator.
- ✓ Among the reporting cities, only 6 cities (5 metropolitan and 1 medium sized city) have more than 50% NMT network.
- ✓ 38 of 126 participating cities have reported on the provision of cycle track as per MoHUA's street design guidelines respectively. These include 22 metropolitan cities, 7 large sized cities, 8 medium city and 1 small towns. None of the small towns managed to showcase evidence on availability of cycle track/lane.
- ✓ 88 of 126 participating cities have reported on provision of footpath as per MoHUA's street design guidelines respectively. These include 40 metropolitan cities, 24 large sized cities, 20 medium sized cities and 4 small towns.

Actions

RANCHI

Ranchi initiated an almost overnight transformation of one ot's busiest streets, MG Road, through a quick tactical urbanism intervention. Using simple temporary measures like paint and traffic barricades, the street space was redesigned to create colourful, dedicated walking paths for pedestrians. This simple first step has created a cascade of promising changes – a first in the state of Jharkhand.

Congress) codes helps cities in developing NMT street design elements. Cities are leveraging funding from the Smart Cities Mission to introduce projects like Public Bicycle Sharing and Smart Roads paving a way for citizens to explore alternative and inclusive ways of transportation. Recent initiatives of Cycles for Change and Streets for People challenge has brought a healthy competitive spirit and inspired cities to initiate pedestrian and cycling-friendly through a participatory approach.

NMT is a highly cost-effective transportation strategy and brings about large health, economic and social co-benefits. The unique nature of Indian sidewalks having a mix of hawkers, property shop spillovers, advertisements and presence of public utilities (toilets, waste collection/ segregation points etc.) create a conflict in usage and poses complex challenges for street redesigning. In addition, difficulty in land acquisition for NMT development in prime locations of the city delays the process in some cases. Keeping in mind these complexities, a more people centric and innovative approach is needed for NMT development and promotion. The indicator on NMT coverage assesses cities on the efforts made to increase NMT infrastructure based on the increase in efficient walking and cycling tracks/lanes. The percentage of total NMT (walking and cycling lanes) length with respect to the total road length of the city is evaluated for this purpose along with evaluating if the city has a dedicated NMT plan.

Way forward to improve NMT infrastructure

- Cities can promote NMT modes by developing a safe environment for cycle lanes and footpaths. Better regulation for signages and safe crossroad islands can be incorporated. Most importantly, improving NMT connectivity to motorized-share mobility hubs will attract more users to use NMT.
- Cities can create awareness on road safety and promote cycle sharing schemes in strategic locations.
- Preparing a baseline for NMT infrastructure, identifying actors and stakeholders who benefit from NMT and evaluating the readiness of the city will help cities to prepare actions and implement to increase the NMT network. Cities can follow the Guidance document developed by MoHUA to develop NMT infrastructure .
- Allocating dedicated funds in the municipal budget for improving NMT and creating new cycle lanes and foot paths can also be considered.

[9,10] Climate Technology Centre and Network, Promotion of non-motorised transport. [Online] Available at: https://www.ctc-n.org/technologies/promotion-non-motorised-transport[Accessed March 2021].

[11] Singh. K, 2018. Mobility and NMT in Sustainable Urban Development –Role of City Developers. Intergovernmental eleventh regional environmentally sustainable transport (est) forum in Asia. United Nations Centre for Regional Development. Ulaanbaatar, Mongolia. [Online] Available at: https://www.uncrd.or.jp/content/documents/6988Background%20Paper%20for%20EST%20Plenary%20Session%205-11th%20Regiona%20EST%20Forum.pdf[Accessed 31 March 2021]

[12] Desai. D, 2020. Non-motorised transport should top the global urban agenda in 2021.Urban futures. Observer Research Foundation. [Online] Available at: https://www.orfonline.org/expert-speak/non-motorised-transport-should-top-global-urban-agenda-2021/[Accessed 31 March 2021]

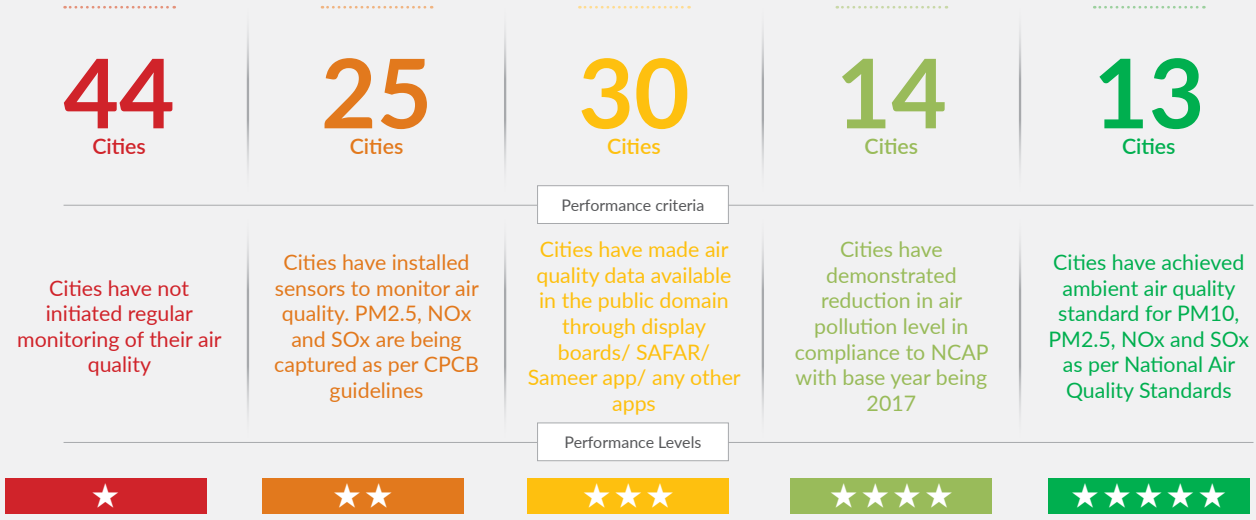
[13] ITDP India, 2019. Cars take a back seat, People of Chennai coming through.[Online] Available at: https://www.itdp.in/tag/nmt/[Accessed 31 March 2021]

INDICATOR 4

Level of Air Pollution (Monitoring)

Air pollution is one of the world's largest health and environmental problems, attributed to 5 million deaths each year, with 9% being globally.[15] The current energy model is fuelling climate change and deprivation of air quality. Asian cities, particularly Indian cities are facing severe consequences wherein the particulate matte are reaching as high as five times above the safety limits creating a major health concern[16]. Globally, the SGDs 3, 11 and 12 provides a framework to reduce mortality due to air quality, reduce urban GHG emissions and regulate safe handling of chemical/hazardous waste to avoid release in air.

In India, the National Air Quality Monitoring Program states that nearly half of the cities monitored have reached critical levels of particulate matter[16]. The National Clean Air Programme (NCAP) initiated in 2019 sets a target of 20 to



Performance of 126 cities

- ✓ Improvement in the air quality has become most significant in recent years with ramping up of pollution monitoring and implementation of mandates/guidelines pertaining to pollution mitigation. Among the 13 *Five Stars* and 14 *Four Stars* cities,
  - » 7 cities have achieved the National Air Quality standard in all the 4 main pollutants (PM10, PM2.5, NOx, Sox as per CPCB).
  - » 12 cities have achieved the National Air Quality Standard in either 2 or 3 of the total main pollutants. The pollutants which were mostly missing were NOx and SOx; as the capturing of PM10 and PM2.5 was highly prominent in cities.
  - » 13 cities have successfully achieved the reduction trend in air pollution as per NCAP target (base year 2017).
- ✓ 97 out of 126 cities were not able to achieve the reduction trend, as the measures of air pollution reduction is an emerging concept for the Indian cities and have come into implementation in recent years. Hence, in the current stage, the capturing of air pollutants has been observed as prominent, and not the reduction trend.
- ✓ Only 16 out of 126 cities are in early stage of basic monitoring as these cities generally having annual/monthly AQI data. However, 4 cities - Jamshedpur, Rourkela, Ujjain and Visakhapatnam are performing regular (minimum 104 readings in a year) basic monitoring of PM10, PM2.5, NOx, Sox as per CPCB guidelines and CO, NH3, Pb, O3 as per NAAQS.
- ✓ 20 of the 126 cities are conducting basic monitoring of both main and additional pollutants at regular intervals. However, monitoring of PM2.5, Pb, O3 is missing.
- ✓ All 9 participating small towns and 6 of 8 hilly cities are in the category of *One Star* and *Two Stars*, indicating that the promotion of air pollution in not active. While air quality may not necessarily be of priority concern in some of these cities, absence of mandatory mandates to align with national level programmes also does not encourage cities to initiate monitoring.

30% reduction of air pollution levels with 2017 as the base year and has mapped out priority strategies for multi-level actions in cities to work towards targeting it.[17] India has approximately 800 total monitoring stations, 200 of which are continuous real time monitoring stations (CAAQMS)[18]. Only five percent of cities and towns (339 out of 6,166) are monitored, and less than one percent (only 60 out of 6,166) of cities have CAAQMS.[19] NCAP aims to increase the monitoring stations across the country along with promoting and researching cost effective technology for source and ambient air quality monitoring. Monitoring data on air quality and making it available to the public will help in framing policies and also allow citizens to make informed decisions that can improve the quality of their lives.

Actions

PUNE

The action plan for emission control details out the activities undertaken for ambient air quality monitoring and the identified sources of pollution in Pune city. It takes stock of the actions taken and a proposed road-map for improved monitoring and reduced pollution.

In order to understand the status of cities and foster key actions in monitoring air quality, this indicator on level of air pollution assesses cities based on PM10 PM2.5, NOx, SOx pollutants monitoring, measures taken to comply with the National Air Quality Standards and the extent of air quality data made available to the public.

Way forward to improve air quality monitoring

- 44 cities which are in the category of *One Star* are recommended to initiate coordinating with their State Pollution Control Board (SPCB) to install continuous air quality monitoring equipment's in public places to capture PM10, PM2.5, NOx and Sox. Using annual arithmetic means of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals needs to be followed to capture appropriate data .
- 25 *Two Stars* cities are recommended to calculate the AQI and make it available to the public via display boards, local apps developed, or data made available as per the SAFAR/SAMEER apps of GoI.
- 30 *Three Stars* cities can compile data from monitoring stations taking 2017 as the base year to document progress and aim to achieve the national level target of 20%–30% reduction of PM2.5 and PM10 concentration by 2024.
- 14 *Four Stars* cities are recommended to initiate implementation of priority actions identified in their Clean Air Action Plan to reduce air pollution and achieve the national standard.

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INDICATOR 5

Clean Air Action Plan (Planning and Implementation)

Air quality, weather and climate, and human health are closely linked. According to the Health Organisation (WHO), seven million people die prematurely from health risks every year owing to air pollution. The First WHO Global Conference on Air Pollution and Health that took place in 2018 passed a resolution that recognized the health impacts of air pollution urging member countries to implement interventions to improve indoor and outdoor air quality. This action symbolized a radical shift in the narrative around air quality management wherein clean air is viewed necessary for poverty reduction and economic growth.

In India, air pollution is the 5th biggest cause of death. There is six times increase in the deaths from air pollution from 2000 to 2010 where high blood pressure that is one of the top five leading causes of death in India has 6% direct linkage with air pollution[21] With the Air (Prevention and

Performance of 126 cities

- ✓ CAAP is a recent mandate for cities in India and the NCAP has identified 122 non-attainment cities based air quality data between 2014-18. Out of 122 cities which are required to submit an action plan to reduce their respective air pollution levels in 2024 by at least 20-30%., only 57 are part of this assessment. 35 out of these 57 non-attainment participating cities have successfully prepared CAAP.
- ✓ Only Pune has managed to progress beyond implementing the identified actions under CAAP and have documented the impact.
- ✓ Among the 38 *Three Stars* and *Four Stars* cities, 24 cities have developed CAAP, action plans or other government related studies and have implemented one to two initiatives towards combating air pollution.
- ✓ 48 *Two Stars* Cities have monitoring stations active at city level with varying types of Manual Stations, Continuous Ambient Air Quality Monitoring Stations (CAAQMS), and Continuous Emission Monitoring System (CEMS). These cities are mostly from the states of Andhra Pradesh, Bihar, Gujarat, Karnataka and Tamil Nadu.
- ✓ Among the 126 participating cities, based on the evidences submitted-
  - » 62 cities have CAAQMS which is highly suggested to get the accurate and regular readings of air pollutants;
  - » 18 cities have manual stations operating in their respective areas;
  - » 6 cities have sensor based monitoring stations.
  - » 1 city has CEMS.

Actions

AHMEDABAD

The Air Information and Response Plan (AIR) plan is aimed to tackle the issue of air pollution and creating healthier communities. The plan is based on five key strategies-i) Pilot Health-Based AQI Warning and Interagency Coordination, ii) Public Awareness and Community Outreach, iii) Focused Activities for Vulnerable Groups, iv) Capacity Building Among Medical Professionals, and v)Initiate Research on Future Exposure Reduction and Mitigation Pathways.

Control of Pollution) Act, 1981, India had taken the first step 40 years ago. Since then, various measures have been undertaken by the central government such as upgradation of National Ambient Air Quality Standards (NAAQS), launch of National Air Quality Index in 2015, and launch of the National Clean Air Programme (NCAP) in 2019- with special focus on comprehensive air quality management in urban area. Following the NCAP, the Central Pollution Control Board (CPCB) identified 122 non-attainment cities for achieving the target of 20 to 30 percent reduction by 2024 with respect to 2017 levels[22].

The indicator of Clean Air Action Plan assesses cities based on their efforts to develop Clean Air Action Plan (CAAP) and air quality management strategy in a comprehensive manner addressing all sectors like transport, industry, energy etc. Identifying the basic level of pollutant sources along with regular monitoring and the preparation, assessment and implementation of CAAP are considered for assessing cities. [23] For a city to become climate smart it should be able to address the issues of reducing air pollution wherein the multiple benefits of good public health and economic growth can also be achieved.

Way forward to implement Clean Air Action Plan in cities

- 39 *One Star* cities can install air pollutant monitoring stations based on the Central Pollution Control Board (CPCB) guidelines for the Measurement of Ambient Air Pollutants. It is important to calibrate the installed sensors in consultation with the CPCB/ SPCB. These cities can also map the locations of air pollution stations and air pollution sensors in the city using a GIS database, by synchronizing Air Quality Monitoring mechanisms with the Integrated Command and Control Centre of the Smart City (ICCC). Cities can refer to the Ministry of Housing and Urban Affairs guidelines to unlock the potential of ICCC.
- Based on the MoEFCC's National Clean Air Program (NCAP), 48 *Two Stars* cities along with the State Pollution Control Board (SPCB) can initiate the development of a Clean Air Action Plan.
- 15 *Three Stars* cities are recommended to strengthen institutional capacity to implement actions as per the Clean Air Action Plan (CAAP). This includes public awareness campaigns and promoting air quality within development projects at the planning and design stages.
- 23 *Four Stars* cities can conduct an impact assessment study to understand air quality improvements upon implementing projects under the Smart City Mission aligned with a clean air action plan.

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Credits:

Nariman Point in Mumbai,

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Actions in the cities

Delhi

Electric Vehicle Policy

Delhi Electric Vehicle Policy launched in 2020 has a vision to make Delhi the EV Capital of India. The Policy aims to achieve the overarching objective to improve Delhi's air quality and create an entire supply-chain ecosystem for this new segment of vehicles. In order to significantly benefit Delhi's air quality, the policy intends to deploy 25% of all new vehicles to be battery-operated vehicles by 2024.

Naya Raipur

BRTS public transport

Naya Raipur has initiated a Bus Rapid Transit service for a seamless connectivity with Raipur and within the city of Atal Nagar. "Intelligent Tracking System" are being used for managing the bus system.

Chennai

Streets for People

Chennai is one of the first cities in India to adopt a NMT Policy in 2014. Since then it has implemented a host of initiatives prioritising pedestrians, cyclists and public transport users. The 'Streets for People' initiative has been instrumental in transforming more than 100 km the city's streets through adoption of complete street guidelines, segregation of vehicular and pedestrian traffic, creation of pedestrian plazas, introduction of public bike sharing services and better management of on-street parking.

59 cities have reported the use of low carbon shared vehicles like buses, e-rickshaws, cabs etc.

87 cities have some form of air quality monitoring stations in their cities

19 cities have achieved National Air Quality standards with two or more pollutants

Coimbatore

City wide Cycling and Pedestrian Network Plan

Coimbatore has recently prepared a city wide cycling and pedestrian network plan which was approved in January 2020. The plan sets out a comprehensive approach for building a network of cycling and pedestrian routes in the city and sets forth a comprehensive set of measures which would put city on a path of achieving sustainable transport goals. The plan has an implementation period of 15 years.

Agra

Air Quality Monitoring enhanced through ICCC

Agra city has deployed 39 Polludrone sensors across the city to monitor ambient air quality It assesses all the critical pollutants present in the air - PM2.5, PM10, CO_2, CO, SO_2, NO, NO_2, and O3, along with the weather parameters - noise, light, UV radiation, temperature, humidity, and rainfall. The dashboard of the system has been integrated with the city's Command and Control Centre. Real-time pollution data can be observed here, which can assist in mitigating the root cause and create awareness among local people and tourists about the current environmental health.

Dehradun

Clean Air Action Plan

Dehradun has prepared the Clean Air Action Plan (2018-22) with the aim to meet the prescribed annual average ambient air quality standards. The Plan includes a city specific need assessment, a detailed GHG inventory and a proposed action plan.

14 cities

have more than 35% of their road network with Non-Motorized Transport (NMT) infrastructure

21 cities

have attained MoHUA's SLB for the availability of public transport