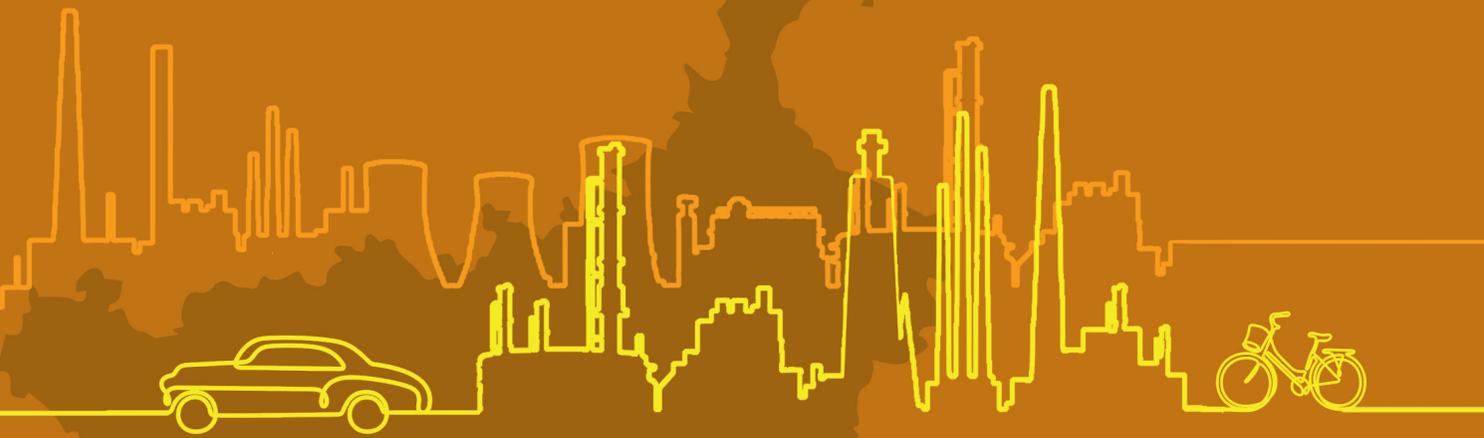




CLEAN AIR ACTION PLAN

HOWRAH



Environment Department
Government of West Bengal

2020



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Objective

This is the initiative of the Government of West Bengal to prepare and implement comprehensive clean air action plan to reduce particulate air pollution in non-attainment cities of West Bengal. The Hon'ble National Green Tribunal's (NGT) order dated 6 August 2019 has added six new non-attainment cities in West Bengal namely Howrah, Barrackpore, Haldia, Asansol, Raniganj and Durgapur to the list of the non-attainment cities. The order has directed, 'Action Plans need to be prepared by States for the additional 20 NACs on the pattern of 102 NACs within three months and after its approval by CPCB within two months, States must initiate time bound action on remediation within next three months'. These cities require to submit the clean air action plans to the Air Quality Monitoring (AQM) committee within three months of the order. The action plans will be reviewed and examined by a three-member committee to implement the plan. These action plans are being prepared within the broader framework of the National Clean Air Programme (NCAP) that has set a generic target of 20–30 per cent reduction in particulate pollution by 2024.

The Government of West Bengal has set up a three-tier committee to facilitate framing and implementation of the clean air plans:

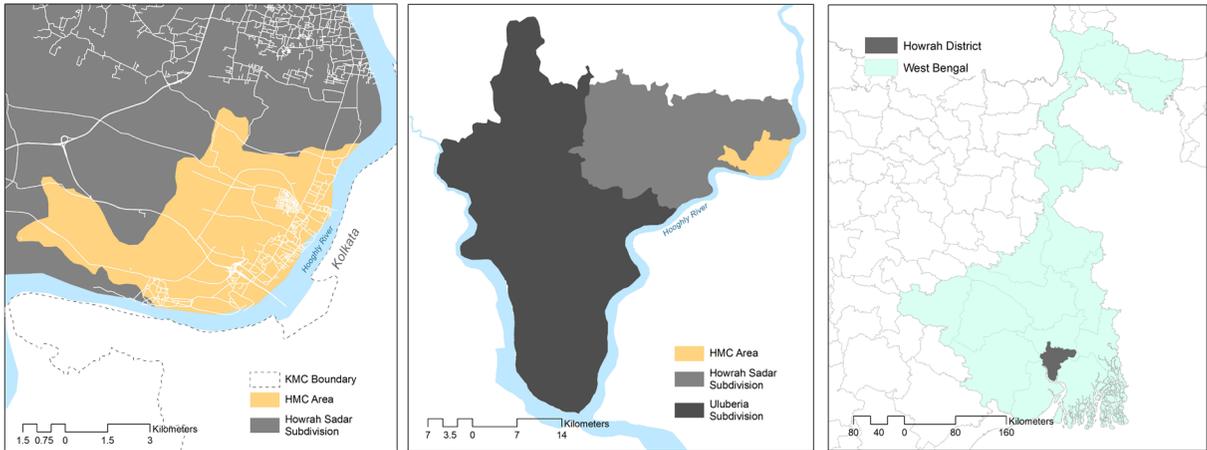
- Steering Committee for implementation of Committee, WB–led by Chief Secretary
- Monitoring Committee for implementation of Committee, WB–led by Principal Secretary, Environment
- Implementation Committee for NCAP in Kolkata–led by Commissioner, KMC

Multi-sector and integrated clean air action plans have been developed for each of the six non-attainment cities of West Bengal. For best results the plans have considered a larger region around the city to take into account the trans-boundary effect of pollution. This report is for Howrah, which is part of the Kolkata Metropolitan Area (KMA) and in its air shed. According to the 2011 Census Howrah district has a population of 4,841,638, with population density of 3,300 inhabitants per square kilometre. Total area of Howrah District is 1,467 km that includes Howrah Sadar and Uluberia subdivision. Kolkata and Howrah are considered twin cities and are part of the same urban continuum. This creates the opportunity for integrated approach to controlling pollution.

This report is divided into two parts.

Part 1 presents the overview of air quality trends, public health evidence, and challenges in each sector that need addressing through the action planning process in the city. This multi-sector plan includes review of current challenge and baseline policy action in the concerned sectors of pollution control including industry, power plant, vehicles and mobility, construction activities, waste burning, road dust, solid fuels in domestic cooking and roadside eateries among others. This has reviewed the available information from existing studies and reports, official databases, field assessment, and information available from the implementing agencies.

Map 1: Howrah district and municipal corporation area



Source: Recreated based on map obtained from <http://www.howrah.gov.in/district/index.html>

Part 2 lays out the proposed Clean Air Action Plan (CAP) and Graded Response Action Plan (GRAP) for each city in tabular form that identifies specific measures in each sector, lists agencies responsible for implementation of measures and the timeline for action. While a substantial part of the proposed measures are common and uniform for all the six cities, further customization has been done depending on the nature of the local issues and problems. The framing of the action plans has taken into account several ongoing initiatives of the Government of West Bengal to implement strategies in each sector that have a bearing on the air quality. This has also drawn upon the existing plans as well as the baseline policy measures to have integrated plan for the city.

PART I
OVERVIEW

1. Air quality concern and public health imperative

1.1 Air quality monitoring

Currently, there are nine manual air quality monitoring stations and five real-time stations in Howrah. In Howrah municipal corporation area there are three real time monitors and four manual monitors. The real time monitors monitor all key regulated pollutants including particulate matter less than 10 micron size (PM10), particulate matter less than 2.5 micron size (PM2.5), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), Carbon monoxide (CO) and ozone (O₃) (see *Table 1: Howrah—locations of the ambient air quality monitoring stations and the parameters monitored*). Two more real-time continuous monitors are scheduled for installation in Howrah Municipal Corporation Area.

Table 1: Howrah—locations of the ambient air quality monitoring stations and the parameters monitored

Station name and location	Parameters monitored
CAAQMS (real time monitoring) stations in HMC Area	
Padmapukur	PM2.5, PM10, NO ₂ , SO ₂ , O ₃ , CO
Belur Math	PM2.5, PM10, NO ₂ , SO ₂ , O ₃ , CO, Benzene, Ammonia
Ghusuri	PM2.5, PM10, NO ₂ , SO ₂ , O ₃ , CO
Manual monitoring stations in HMC Area	
Bandhaghat	PM10, NO ₂ , SO ₂
Bator	PM10, PM2.5, NO ₂ , SO ₂
Howrah Municipal Corporation (HMC)	PM10, PM.5, NO ₂ , SO ₂
Ghusuri	PM10, NO ₂ , SO ₂
Stations outside HMC area but within Howrah district	
Amta	PM10, NO ₂ , SO ₂
Bagnan	PM10, NO ₂ , SO ₂
Sankrail	PM10, PM2.5, NO ₂ , SO ₂
Dhulagarh	PM10, NO ₂ , SO ₂
Uluberia	PM10, NO ₂ , SO ₂
CAAQMS maintained by industries out side HMC area but inside Howrah district	
ACL Sankrail (CAAQMS)	PM2.5, PM10, NO ₂ , SO ₂ , O ₃ , CO
CESC Bauria (CAAQMS)	PM2.5, PM10, NO ₂ , SO ₂ , O ₃ , CO

Source: As provided by the West Bengal Pollution Control Board

Currently, there are two air quality data reporting systems. West Bengal Pollution Control Board (WBPCB) website reports data from all manual and real-time monitoring stations. The data from manual stations is reported twice a week whereas the data from real-time monitoring stations is reported daily. In Howrah district, there are five automatic real-time stations that include ACL Sankrail, CESC Bauria, Ghusuri Padmapukur and Belur Math. CPCB provides daily real-time data from Ghusuri and Padmapukur stations daily. WBPCB reports real-time data from three stations namely Belur Math, Ghusuri and Padmapukur. All the real-time stations are monitoring PM2.5 in addition to other criteria pollutants. PM2.5 monitoring for Howrah started around 2017–18. Howrah has experienced smog episodes. This will have to be tackled with utmost urgency.

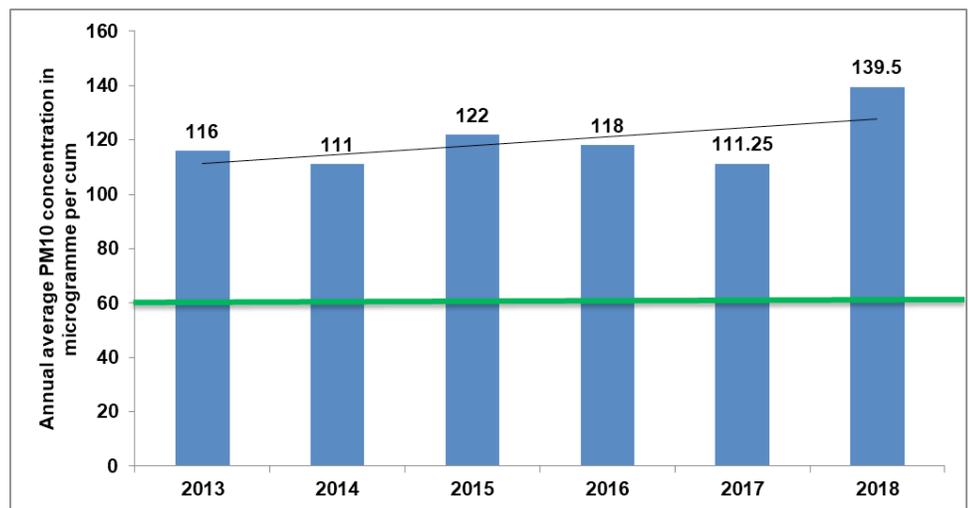
1.2 Status of air quality

Long-term annual average trend in PM10

Longer-term trend analysis helps to understand impact of action on longer-term ambient concentration as well as helps to assess the current baseline of the pollution concentration and the target reduction needed to meet the National Ambient Air Quality Standard (NAAQS). As per the international best practice such as the method used by the US Environmental Protection Agency (USEPA), an annual average of immediate past three years is taken to define the base pollution level and, accordingly, the target reduction is set. Setting such targets helps to determine the level of reduction that is needed and, accordingly, workout the detailed measures for all sources of pollution.

For longer-term trends in annual average levels, the PM10 data reported by WBPCB has been analyzed. This shows there is an increasing trend in annual average PM10 levels in Howrah and the city requires to reduce PM10 concentration by 51 per cent from the base level to meet the annual standard (baseline is the average of three consecutive years of 2016–18) (see *Graph 1: Howrah—long-term trend in annual average level of PM10 concentration*).

Graph 1: Howrah—long-term trend in annual average level of PM10 concentration

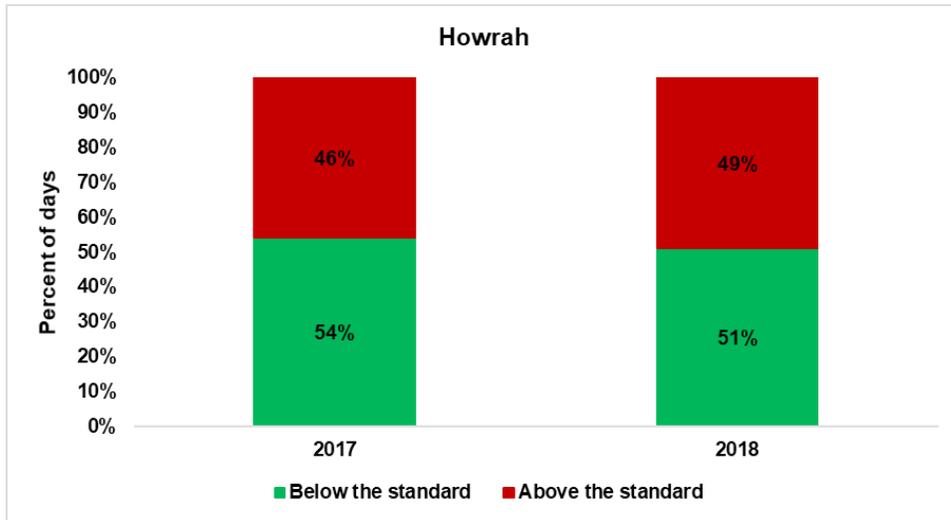


Note: Includes monitoring stations of HMC, Bator, Bandhaghat, and Ghusuri

Source: Based on the data provided by WBPCB

Analysis of daily or 24-hr average PM10 data shows that close to half of the days monitored in a year exceed the National Ambient Air Quality Standard for PM10. Monitoring of PM2.5 is more recent and therefore long-term trend cannot be constructed. The number of days violating the PM10 standard show an increase. (see *Graph 2: Increase in number of days exceeding PM10 standard*).

Graph 2: Increase in number of days exceeding PM10 standard (2017 and 2018)



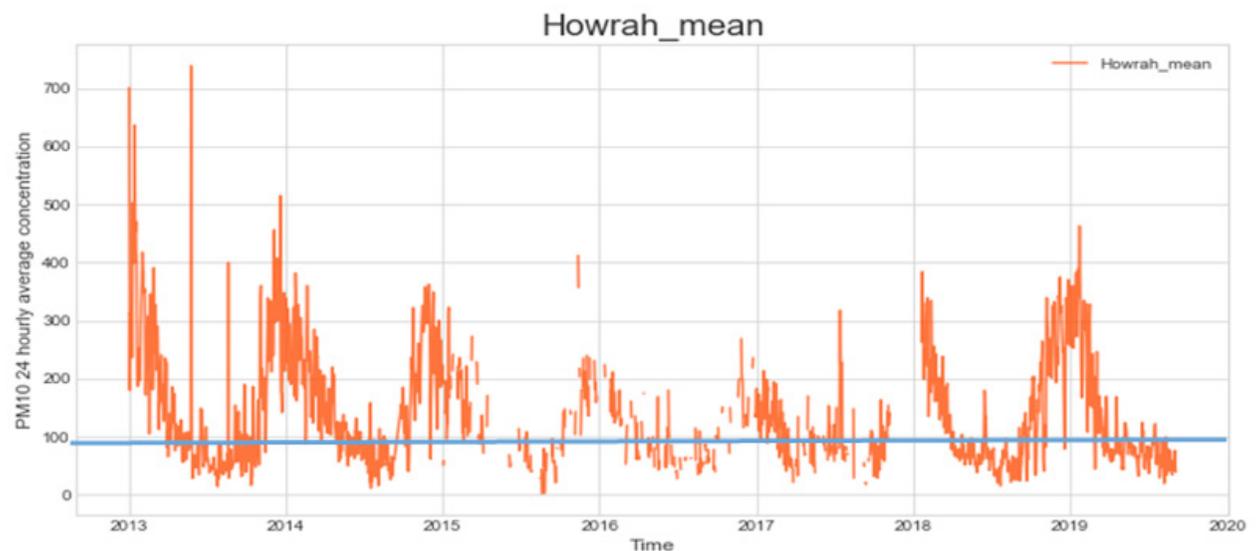
Note: Includes monitoring stations of HMC, Bator, Bandhaghat, and Ghusuri

Source: Based on the data provided by WBPCB

Seasonality of pollution

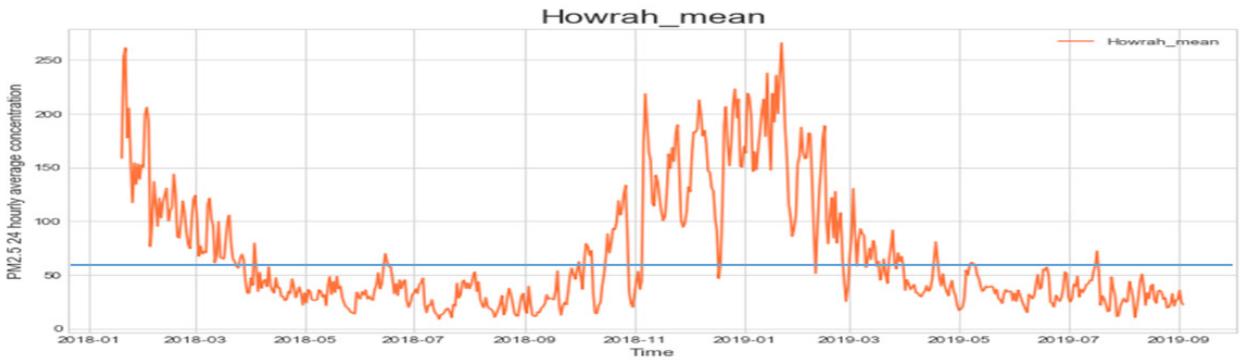
Daily air pollution trend bears out distinct seasonality. Pollution peaks during winter when inversion, cold temperature and slower wind speed traps pollution and aids in rapid build-up. This is reflected in both PM10 and PM2.5 concentration.

Graph 3: Seasonal variation in daily PM10 trend in Howrah (2013–18)



Source: Based on CPCB air quality data (https://app.cpcbcr.com/AQ_India/)

Graph 4: Seasonal variation in daily PM2.5 trend in Howrah (2018 and till September 2019)



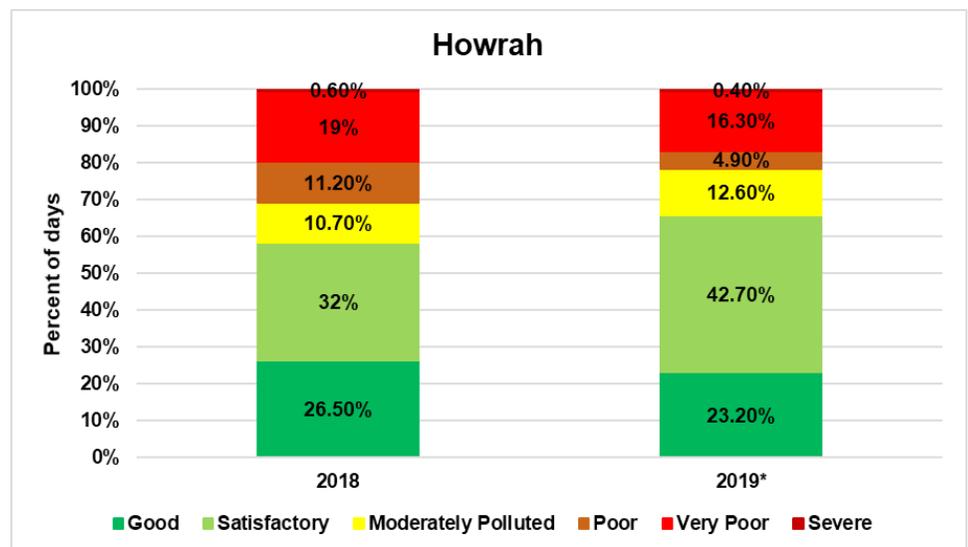
Source: Based on CPCB air quality data (https://app.cpcbcr.com/AQI_India/)

Categorization of daily air pollution data shows that close to 20 per cent of the days in a year can be in very poor category as per the National Air Quality Index. Less than one per cent of the days are in severe category. Such episodes are experienced during winter months.

This variation is distinctly evident in the heat map of PM10 pollution for summer and winter. At the time of the preparation of this report in October air quality data for the year 2019 was available till September. Winter months when the pollution levels are usually at the highest are not included in the year 2019.

In the longer-term, emissions need to be permanently reduced so that peak episodes are prevented. This requires a more comprehensive action plan with short and long-term measures and targeted reduction over time to attain the national ambient air quality standards and to address the non-attainment status.

Graph 5: Categorization of daily PM2.5 based on AQI categories for 2018 and till 03 September, 2019)



Note: Monitoring stations include Belur Math, Ghusuri and Padmapukur

Source: Based on CPCB air quality data from https://app.cpcbcr.com/AQI_India/

Box 1: National air quality index and daily emergency response

A short-term emergency response is designed to control daily pollution peaks and reduce exposure and associated health risk. Smog episodes largely occur when weather is adverse with calm atmosphere or no wind, cold temperature, and lower mixing height of air that traps air and pollution very close to the ground. This increases exposure drastically. While nothing can be done to control weather, or to remove trapped emissions already present in the atmosphere, short-term policy action can control further loading of emissions and prevent higher smog peaks. This is needed to reduce exposure and protect public health.

The National Air Quality Index (NAQI) and a corresponding health advisory were notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in 2015. Based on this index, daily pollutant concentrations are classified and graded as good, satisfactory, moderate, poor, very poor and severe and colour-coded so that the general public can understand the gravity of the problem. The health advisory has also been framed to indicate the expected health outcomes at varying severity of daily air pollution (see *Table 2: National Air Quality Index of India* and *Table 3: Health Advisory at different AQI levels in India*).

Table 2: National air quality index of India

AQI category (Range)	PM ₁₀ 24-hr	PM _{2.5} 24-hr	NO ₂ 24-hr	O ₃ 8-hr	CO 8-hr (mg/m ³)	SO ₂ 24-hr	NH ₃ 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately polluted (101-200)	101-250	61-90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	Oct-17	381-800	801-1200	2.1-3.0
Very poor (301-400)	351-430	121-250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401-500)	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

Note: Ambient concentration values of all regulated pollutants are compared with corresponding standards, and an exceedance factor is used for qualitative assessment of air quality. Air quality for a particular pollutant is defined as good, satisfactory, moderate, poor, very poor, and severe if concentration value is < 0.5, between 0.5 and 1.0, >1.0 but <1.5, and >1.5 times the standard value for that pollutant respectively.

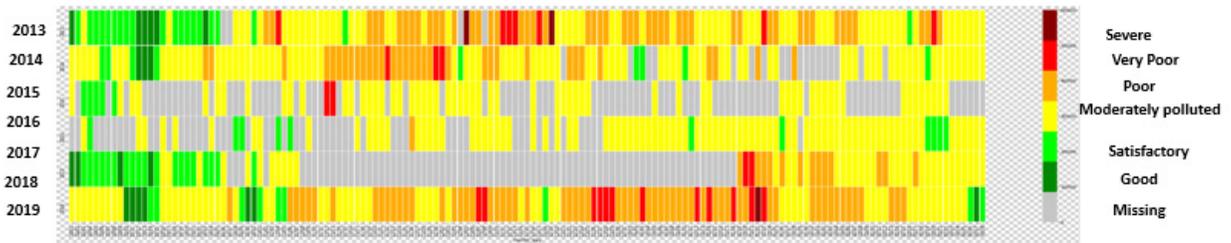
Source: Ministry of Environment and Forest and Climate Change

Table 3: Health advisory at different AQI levels in India

AQI	Associated health impacts
Good (0-50)	Minimal impact
Satisfactory (51-100)	Minor breathing discomfort to sensitive people
Moderately polluted (101-200)	May cause breathing discomfort to the people with lung disease such as asthma and discomfort to people with heart disease, children and older adults
Poor (201-300)	May cause breathing discomfort to people on prolonged exposure and discomfort to people with heart disease
Very poor (301-400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases
Severe (401-500)	May cause respiratory effects even on healthy people and serious health impacts on people with lung or heart diseases. The health impacts may be experienced even during light physical activity

Source: Ministry of Environment and Forest and Climate Change

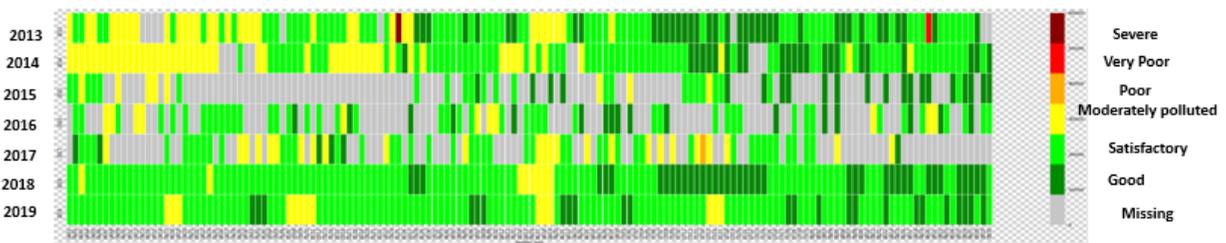
Graph 6: Mapping SMOG days during winter in Howrah (based on PM10) 01 October 2018 to 28 February 2019



Note: X-Axis represents dates of sampling.

Source: Based on CPCB air quality data collected from <https://app.cpcbcr.com/ccr/>.

Graph 7: SMOG days during summer in Howrah (based on PM10) 01 March to 04 September 2013–19



Note: X-Axis represents dates of sampling.

Source: Based on CPCB air quality data collected from <https://app.cpcbcr.com/ccr/>.

Long-term annual average trend of NO₂ in Howrah

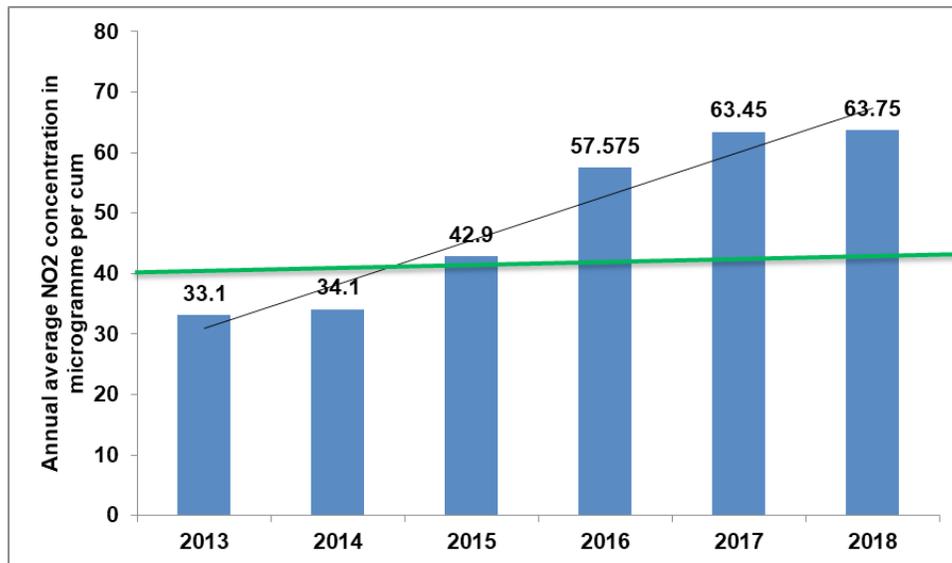
Nitrogen dioxide levels will require special attention as these are strongly correlated with motorization and industrialization. Nitrogen oxide also contributes towards ozone formation, which is yet another very harmful gas. Data reported by WBPCB shows an increasing trend over time (see *Graph 8: Long-term trend in annual average NO₂ concentration in Howrah*). NO₂ is predominantly attributed to combustion sources, primarily traffic sources. The reduction target for NO₂ levels for Howrah is approximately 35 per cent from the baseline of average of 2016–18.

1.3 Public health evidence

Longer-term systemic strategies need to be put in place to reduce pollution levels over time and reduce long-term risks of developing and worsening respiratory diseases, metabolic diseases, and cancer, which is the end point of toxic risk. Widely investigated link between air pollution and a range of disease profiles have demonstrated an insidious links between air pollution and COPD, ischaemic heart diseases, hyper tension, diabetes, effect on brain and a range of cancers. Air pollution is a serious risk factor. In fact, in 2012 the WHO classified a group of air pollutants as Class I carcinogens and has specially classified diesel emissions as Class I carcinogen for its strong links with lung cancer. Air pollution is a serious contributory risk factor.

Most of the metabolic diseases and cancers develop over time triggered by longer-term exposures. In fact, studies show that these effects occur at an

Graph 8: Long-term trend in annual average NO₂ concentration in Howrah (2013–2018)



Note: Data from monitoring stations in HMC, Bator, Bandhaghat, and Ghusuri.

Source: Based on the data provided by West Bengal Pollution Control Board.

annual average level that is much lower than the levels recorded in the city. This requires reduction in annual average levels not to the level of national air quality standards but further down to the level of WHO guidelines for public health protection.

Howrah specific health impact studies have not yet been carried out to provide local evidence. However, according to findings of a recent study published in the *Lancet* journal, titled *The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: the Global Burden of Disease Study 2017*, 94,534 deaths in West Bengal in 2017 can be attributed to air pollution. While the estimated number of deaths attributed to household air pollution is 49,882 that due to ambient air pollution is 38,846. This is indicative of the fact that people in West Bengal are at a greater risk from household air pollution than ambient air pollution. The report also states that life expectancy in West Bengal would increase by 1.7 years if air pollution concentrations were less than the minimum level causing health loss.

The state's first ever state-level disease burden estimates released by IHME, ICMR and PHFI in 2017 show that air pollution ranks as the third highest risk factor in West Bengal responsible for premature deaths in the state. In the disease profile of the state, ischaemic heart diseases have been identified as one of the leading causes of loss of productive life years. These diseases are greatly influenced by air pollution. Air pollution is a serious short-term trigger factor for causing early deaths due to heart disease.

More studies are available for Kolkata that is in the vicinity of Howrah. A recent study on air pollution and human health in Kolkata published by MDPI in October 2017 has surveyed three dispensaries with 100 participants. This showed that respondents with respiratory diseases (85.1 per cent) far exceeded those with waterborne diseases (14.9 per cent) and included acute respiratory

infections at 60 per cent, chronic obstructive pulmonary diseases (COPD) at 7.8 per cent, upper track respiratory infection at 1.2 per cent, influenza at 12.7 per cent, and acid fast bacillus at 3.4 per cent. Thus, much higher numbers of people are suffering from respiratory problems and COPD. This highlights the serious risk of exposure to air pollution.

The study of air quality by CPCB in 2010 had estimated excess cancer risk for people residing in Kolkata. It shows an alarming 3,176 persons in every million population are at risk. According to Census 2011, Kolkata (Urban Agglomeration) has 14,035,959 people. Given its population level, this risk translates into 44,578 persons under threat of developing some kind of cancer due to inhalation of these carcinogens. Medical doctors in Kolkata have already reported growing incidence of lung cancers even among non-smokers.

The series of studies carried out by Chittaranjan National Cancer Research Institute (CNCI) in Kolkata have thrown up very valuable data and evidence on the very harmful longer-term health effects of air pollution as well. One of the CNCI studies has shown that more than 18 persons per one lakh people in Kolkata fall victim to lung cancer every year, compared to the next highest 13 per one lakh in Delhi. More than seven in ten people here suffer from various kinds of respiratory disorders, including children as well as elderly people. Cases of heart attack are also rising rapidly. Air pollution is a very serious contributory risk factor. Close to 42,000 persons are under threat of developing some kind of cancer due to inhalation of carcinogens in the air of Kolkata.

Their studies have shown that traffic-related air pollution is associated with a 6.5-fold rise in alveolar macrophage number in traffic policemen and street hawkers of Kolkata. This is much higher compared to less exposed office workers. The alveolar macrophage number in sputum is a sensitive biomarker of cumulative exposure to air pollution. Also, the percentage of children suffering from upper respiratory infection, cough, wheezing and eye irritation is reported to have increased in direct proportion to increased concentration of PM10.

CNCI has conducted a 10-year study, funded by the Department of Environment, West Bengal, the Central Pollution Control Board and the Union Ministry of Environment, Forest and Climate Change to assess health effects by using pollution-sensitive biomarkers. The objectives have been to prepare a database on respiratory diseases and systemic changes in children of urban and rural areas, and adult residents of Kolkata and Delhi, with different age, gender, occupation and socio-economic status, and to explore the underlying mechanisms involved in pollution-related diseases so as to develop effective intervention strategies.

These evidences need to be considered to frame clean air planning strategies to avert public health emergency.

2. Pollution source profile and baseline policy action

Air pollution control strategy will need baseline information on the sources and their relative contribution to ambient air pollution concentration, pollution load as well as on population exposure. Specific source apportionment and inventory studies have not been carried out in Howrah. The last source apportionment study for Kolkata Metropolitan Area was carried out by WBPCB with support from the Asian Development Bank (ADB) way back in 2005. This PM_{2.5} source apportionment based on PM_{2.5}/PM₁₀ ratio showed that about a decade ago vehicles contributed 49 per cent or close to half of PM_{2.5} in KMA followed by area sources at 19 per cent, industry and power plants at 17 per cent, and dust at about 15 per cent. At that time, vehicles were the dominant source of PM_{2.5}.

More recently, another study published in the *Atmospheric Pollution* journal in 2015, on trace element composition of PM_{2.5} and PM₁₀ in Kolkata, has analyzed the trace element composition of particulate matter in Greater Kolkata. It identifies emissions from municipal waste incinerators and smelting units as contributors to particulate pollution in the area. This study on trace element composition, however, is indicative of the nature of polluting sources in KMA. It only identifies the possible sources but has not given the relative contribution. Additional sources have been inferred from other studies. These include restaurants, open-eateries, bakeries, and informal industrial setups that also contribute significantly to the emission load. Kolkata Zonal Laboratory of NEERI is conducting a detailed inventory of sources and a comprehensive source apportionment study. Its results are expected in early 2020. However, the reportage on its draft finding shows that vehicles, open eateries, and construction activities are among the major sources of pollution.

Once these studies are carried out in the non-attainment cities, the action plan can be further modified/refined. The action plan therefore proposes detailed source apportionment and source inventory studies.

However, for the purpose of the preparation of this base plan a broad range of information on the gamut of sources in the city is also available from the regional offices of the pollution control board and the field inspection. It is also possible to piece together the fragmented estimates that exist on pollution sources from different studies done over time.

For the purpose of this report, field visits were organized to identify the key pollution sources in the city. Also, feedback was received from concerned regional offices of SPCB. This has helped to map out the key big sources of air pollution. Even though the exact quantification is not possible without the detailed source apportionment and inventory studies that will be carried out in the future, it is possible to define the key measures based on the best practices and also keeping in view the desired reduction target that requires deep cuts in emissions from all sources.

2.1 Industry and power plants

This industrialized region has small and informal as well as large and organized industries. According to the 2016 State of Environment Report of West Bengal, there are about 38,386 small, 996 medium, and 1,337 large-scale industries

that are registered with the West Bengal Pollution Control Board. The report classifies thermal power plants, oil refineries, petrochemical plants, integrated iron and steel plants, paper and pulp mills, fertilizer factories, as large and medium-scale units. On the other hand, foundries, rolling mills, smelters, galvanizing, dyeing and bleaching units are classified as small-scale industries. These are also air polluting industries. Several industries including paper and textile mills use boilers.

Howrah is the centre of metal work in the Kolkata Municipal Area. Howrah has large number of foundries, rolling mills, and smelting units. The units employ boilers and furnaces which, if unchecked, could again result in significant emissions. Howrah has been identified as a critically polluted industrial area by MoEF&CC owing to its large number of foundries, rolling mills, metal-working and garment manufacturing and earthen pottery units. In 2010, the WBPCB initiated a series of plans and actions to alleviate Howrah's pollution problem.

The registered small-scale industries of the West Bengal Pollution Control Board do not include large number of informal set-ups. Since these units are unregulated, there might not be any emission controls in place. There is need for an inventory of these units. WBPCB maintains a record of all regulatory orders, including closures and guidance, on its website. A review of the regulatory orders passed between 2015 and 2017 shows that most industrial set-ups that have boilers with capacity more than 2TPD or furnaces are equipped with air pollution control mechanisms like electrostatic precipitators and scrubbers.

However, there are concerns around enforcement and proper operations of pollution control systems. Several qualitative field observations in and around Kolkata and Howrah during the rapid survey have helped to highlight some of the challenges. Pollution control devices are often not operated in several units. In Ichapur, there are a large number of foundries and metal-working units, some of these are operating from cramped single rooms. The data on foundries is available on the website of Foundry Cluster Development Association of West Bengal. At present around 500 units exist in West Bengal with an installed capacity of one million tonnes; 95 per cent of these units are concentrated in the district of Howrah forming an informal cluster. In 2001 with the introduction of stricter emission standards, many foundry owners were compelled to install divided blast cupola furnace with pollution control devices at their units. Many foundries were also shut down. While most existing units are equipped with air pollution control devices, several foundries tend to not operate them. Foundry pollution being a major cause of concern, regular surveillance of such units becomes essential.

There are concerns around enforcement and proper operations of pollution control systems. This will require more rigorous onsite continuous emissions monitoring system (CEMS) for compliance. The major issues with industrial pollution is that though the end stack emissions can be controlled and monitored through CEMS, the problem of fugitive emissions during the different processes such as handling, conveying and storage continue to persist. Further, quality control and adherence to standards during CEMS installation is important.

Emissions standards and siting policy: Industrial pollution management is governed by the emissions standards fixed by the Central Pollution Control Board. Both existing and new standards will have to be implemented with strong compliance and penal requirement. While the ongoing effort will be strengthened further, the new set of emissions standards that have been framed

recently will require immediate implementation. The case in point is the new SO_x and NO_x standards that have been notified by the MoEF&CC for 16 groups of industries following the direction of the Supreme Court on 29 January 2018. Further strengthening of siting policy for industrial units will help to reduce exposure and public health risk in populated areas.

The industrial siting policy in West Bengal clearly states that setting up of any red category industries is not permitted within the municipal areas of Kolkata, Howrah MC and Bardhaman district except Jamuria industrial estate. But with adequate pollution abatement technologies/systems red category industries can be set up outside the KMA and Bardhaman district.

Industrial fuel quality: In addition to improving and advancing the emission control systems in industry, ensuring use of cleaner fuels will provide more systemic solution. Often due to wide difference in pricing of industrial fuels dirty bottom of the barrel fuels like petroleum coke and fuel oil (FO), etc. are widely used. In smaller units unregulated fuels like tyre oil, etc. are used. Some of the industries in the city have already started using coalbed methane but the supply is less available. This is a step in the right direction and in line with the action being taken in other states to control and discourage dirty fuels.

Clean fuel strategy along with stringent emissions control systems will require incentive policy to make a supply plan and infrastructure for cleaner fuels, favourable taxation and pricing policy to make cleaner fuels competitive vis a vis the dirty fuels and help to phase in clean fuels for industries (such as natural gas, electricity, and low-sulphur fuels). Access to natural gas and oil is improving in the state and may be leveraged to promote their usage in the industrial sector as much as possible with a proper pricing and regulatory policy. Industries that will be using coal will require stringent emission control system and monitoring.

Dirty fuels are also used in small and unauthorized units without pollution control systems. There are also risks of several unregulated oils like recycled oil, tyre oil, etc. filtering in causing enormous toxic pollution. Therefore, notified approved fuels list can help to counter such risks in all sectors.

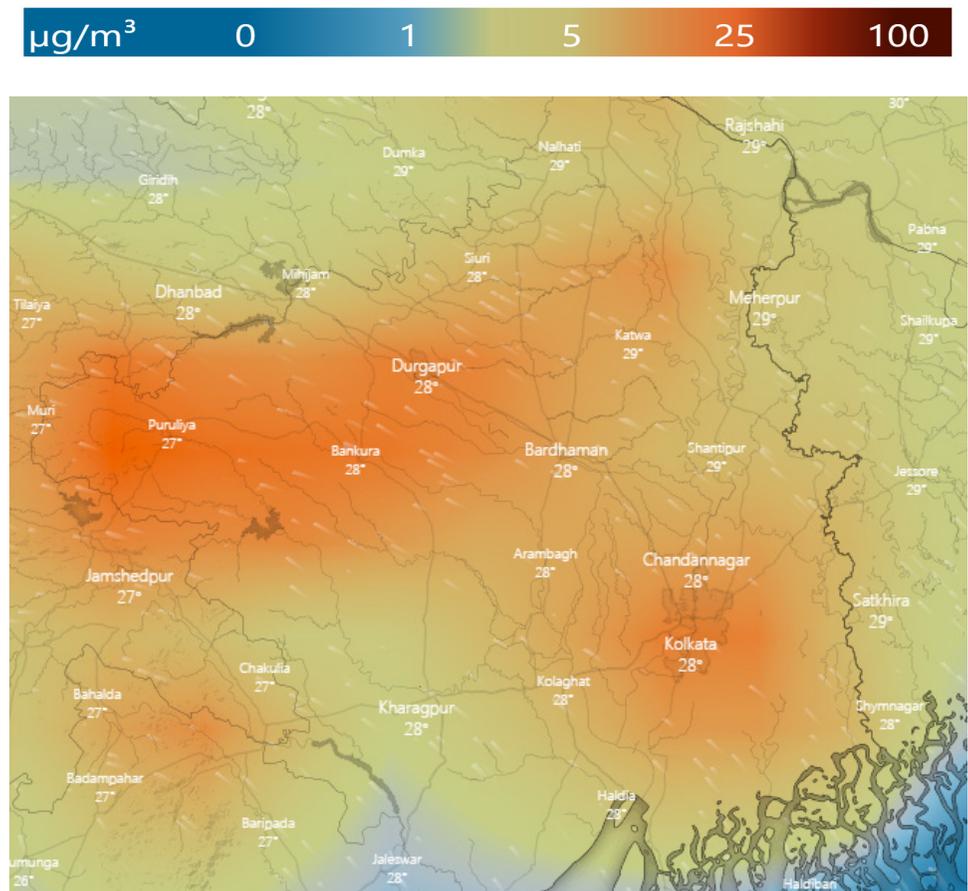
In view of the growing use of heavy furnace oil in the sector it is important to take on board the national level development in this regard for future reference and roadmap. The concerns over the growing use of pet coke and furnace oil in industry that have very high sulphur and heavy metal content have led to the notification on the emissions standards for SO_x and NO_x following the direction of the Hon'ble Supreme Court. This is needed to enable effective uptake of improved emissions control systems to control these gases. Testing of petroleum coke and fuel oil used for combustion in Delhi region have been found to contain as high as 75,000 ppm and 20,000 ppm sulphur respectively.

This is in sharp contrast to the current transport fuel quality that has 50 ppm sulphur that will be further lowered to 10 ppm sulphur in 2020. Fuels containing high levels of sulphur lead to high emission of particulates, gaseous emissions like SO_x and contribute to 'secondary' particulate load. High-sulphur fuels also contain heavy metals, which adds to the toxicity and contamination of the environment. The Supreme Court of India vide order of 24 October 2017 has banned use and sale of petroleum, coke and fuel oil in Haryana, Rajasthan and Uttar Pradesh. Delhi had banned these fuels in 1998. Only those like cement industry are allowed to use this as feedstock but not fuel. Further, in the

order dated 13 July 2018, the Supreme Court has asked for a ban on import of petcoke into India, with specific exemptions given to four categories of Industries. The Ministry of Commerce, GOI has issued an order dated 17 August 2018 to this effect. Further, under India's commitments to the WTO, the country's laws are bound to treat imported and domestic pet coke equally. As of November 2018, the Ministry of Commerce & MoEF&CC are considering restricting the usage of all pet coke in India—domestic and imported. These developments may be noted.

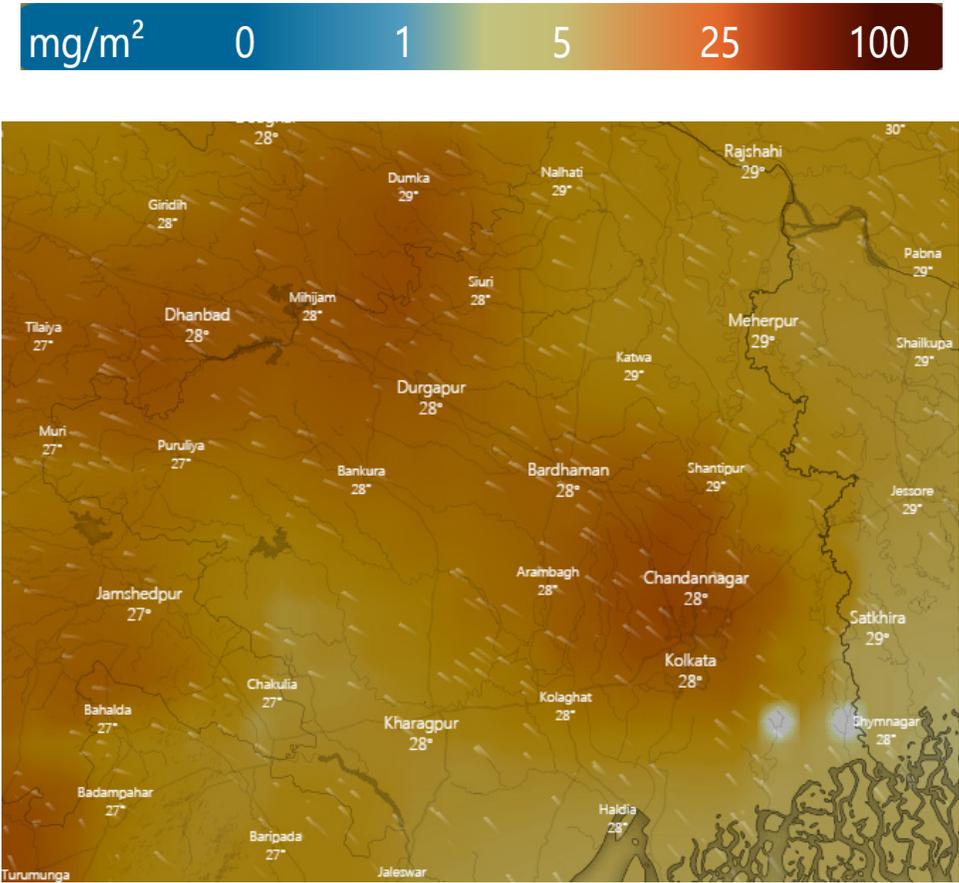
Use of dirty fuels has a significant effect on the concentrations of ambient SO₂ and NO₂. Satellite data helps to visualize the regional level build up of pollutants. The satellite measures the total amount of pollution from the Earth's surface to the top of the atmosphere, which is related to - but not the same as - the concentration at the surface. The Windy data shows how pollution can travel with the wind and is a visualization of the dispersion of pollution due to the wind and not the absolute pollution that is present in a region.

Figure 1: NO₂ spread on 04 September 2019



Source: Source: Windy.Com

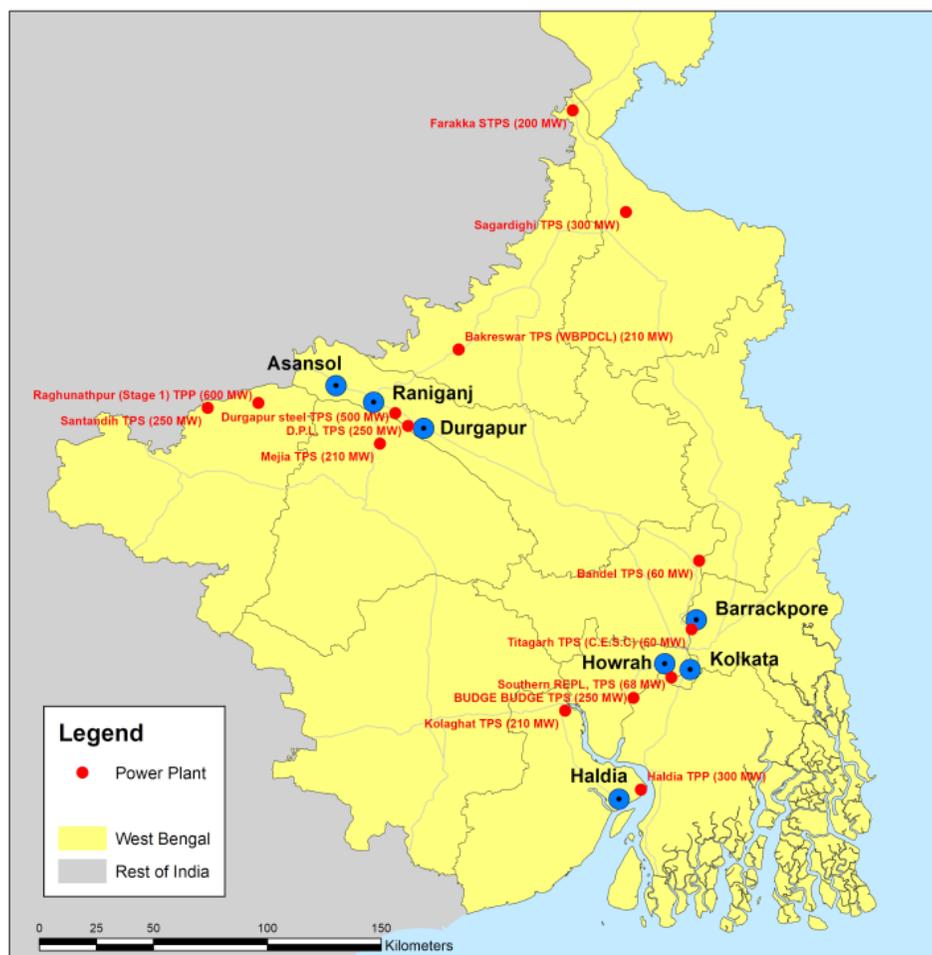
Figure 2: SO₂ spread on 04 September 2019



Source: Windy.Com

Howrah region is also influenced by the thermal power plants that are located close to or in the larger KMDA (see *Map 2: Location of thermal power plants in West Bengal*).

Map 2: Location of thermal power plants in West Bengal



Baseline policy action to control industrial pollution: Several policy measures have been initiated to address industrial pollution. The baseline policy action includes:

- **Stricter location policy** for new industrial units and restriction on setting up of red category industries in municipal area of Kolkata Metropolitan Area and Bardhaman district except Jamuria industrial estate.
- **Efforts to ensure regulatory compliance** for grossly polluting industries.
- **West Bengal Pollution Control Board notified stricter emission standards** for boilers, ceramic kilns, foundries and rolling mills with effect on 11 May 2001. These emission standards are stricter than national emission standards.
- **Mandatory use of clean fuels:** Replicate Kolkata model of incentivizing small and medium-scale units to improve and replace boilers and coal fired down draft kilns. Create awareness on use of solar energy in cities for commercial

and industrial application. Incentivize renewable energy practitioners with tax incentives, single window clearances, etc. to add to the long-term cost effectiveness of solar energy. Rooftop and community based solar devices to be encouraged, as envisaged in West Bengal Renewable Energy Policy.

- **Coal use restricted in industries:** About 67 per cent of the coal-fired boilers and about 73 per cent of the coal-fired ceramic kilns have already been converted to oil-fired ones in KMA.
- **Promote use of LPG in small industries:** As per data received from West Bengal Industrial Development Cooperation, a total of 269,117 LPG connection were issued as of October 2019 by Hindustan Petroleum Cooperation Limited in Bardhaman district. This is a welcome move and small-scale units in Howrah should also be encouraged to use LPG wherever feasible. Exemption of registration fees may be given after discussions with HPCL.
- **Financial assistance to the small industries** for pollution control by the WBPCB and the state government. The WBPCB is encouraging the industries to go 'beyond compliance' and good performers are honoured with 'environmental excellence awards'.
- **CEMS monitoring and data:** WBPCB, through its online CEMS portal, provides stack emission and effluent discharge information. However, at this stage this information is not available for most industries. This is certainly an opportunity for better management and monitoring of CEMS portal for the listed industries for improved monitoring.
- **Enforcement of new NO_x and SO_x standards in the industry:** MoEF&CC notified new NO_x and SO_x standards for 16 groups of industries in March 2018. This opens up new opportunity for disciplining industrial emissions and accelerating use of clean fuels.
- **Comprehensive consent mechanism:** All industries of the state are required to go through a comprehensive consent mechanism prior to establishment as well as prior to operation following the transparent 'industrial siting policy' prevalent in the state. Once the industries are established and are operational, they are subject to priority surveillance and monitoring of their environmental performance. All non-compliant industries are subjected to regulatory action.
- In addition, Central emission regulation Part-3 is to be implemented. An order issued to all state and Union Territory pollution control boards to not issue renewal notices or mention it in the consent to establish or consent to operate document, and to provide stack monitoring facility to all stacks with boilers in accordance with the order.
- **Data reporting and storage:** A comprehensive and lucid data recording and sharing policy must be drafted for industrial pollution management. This will include detailed data protocol for recording emissions from industry along with a systematic data maintenance system. This may be uploaded to a central server with limited access to compliance officers.

Table 4: Generic guidance to reduce fugitive emissions from key industries in West Bengal

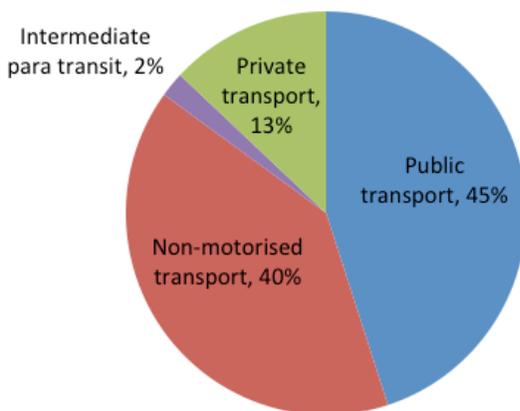
Sr. no.	Industry type	Key sources of fugitive emissions	Suggested strategies for reduction
1.	Cement	Limestone and coal crushers, vents and tunnels in raw mill and coal mill sections, clinker silo vents, vents in clinker silos, surge bins and cement silos. Packing machines (silos to cement bags). Non process emissions from roads, internal transfers, raw material stockpiles and product stockpiles.	Use of DSS, bag filters on all vents. All transfer points to be fully enclosed, windbreak walls or greenbelt on three sides of open stock piles. Dry fly ash to be transported by closed tankers. Fly ash to be removed immediately after drying. Provisions for dust extraction arrangement for packing machines to be made. All silo vents to be provided with a bag filter type system to vent out the air borne fines. All roads on which vehicle movement of raw materials or products takes place to be paved. Use of mobile road cleaners and use of tarpaulin covers for open stock piles to be made mandatory.
2.	Parboiled and regular rice mills (waste water generation ≥ 100 KLD or fuel ≥ 12 MTD or both)	Open storage bins, de-stoner machines, different stages of lifting and discharging of paddy /rice through bucket elevators, aspirators used for husk removal, boiler ash conveyance from boiler to trolley, uncovered and unprotected disposal sites, rice graders in the milling section, leakages in the ducts/flanges from boiler to stack.	Ash generated in furnace to be manually taken out in pits. Storage of rice husk only in closed areas. Cyclone cum bag-filters in pre-cleaning areas. Dust extraction systems for de-stoners, paddy weighing machines, paddy separator / huller and aspirators. Blowing of husk in storage areas to be done in a closed room. During transportation of husk through vehicles, it should be covered from all sides with tarpaulin to prevent wind blowing of husk. During loading & unloading of ash, water to be sprayed periodically to keep the ash heap in wet condition so that top layer remains wet thereby prevent blowing of ash particles due to wind. Mill location to be in line with CPCB guidelines (away from highways). The industry to carry out thick plantation of spreading crown trees all along the boundary wall of the plant. For large rice mills, a green belt of 3 m width shall be developed. For other rice mills, at least 2 rows of trees shall be developed along the boundary wall of plant.
3.	Iron & steel (involving processing from ore / integrated steel plants) and/or sponge iron units AND Steel and steel products using various furnaces like blast furnaces / open hearth furnace / induction furnace / arc furnace / submerged arc furnace / basic oxygen furnace [industries attracting EIA (Notification) 2006 as amended]	Loading/unloading of granular raw materials, leakage from coke oven battery doors, lids and gas off-takes, pushing of coke, quenching of coke, crushing and screening of slag, tapping of molten metal and slag, charging of furnace, pressure relief devices in gas/ vapour service.	Use of hoods and enclosure for all process equipment, use of covered or enclosed conveyors and transfer points, hooding of emission controls of the blast furnace tapping operations and discharge of molten metal and slag, covering of ladles containing molten metal, Scrap Management Program for the prevention or minimization of contaminants in steel scrap and other feed materials, enclosures for emission controls of the charging and tapping operations. Minimizing the number of flanges by welding piping connections wherever possible and using appropriate sealing for flanges and valves, wet quenching of coke as opposed to conventional quenching, use of larger oven chambers and regulation of pressure within oven chambers.

2.2 Vehicles and mobility

Comprehensive Mobility Plan was prepared for urban areas of KMDA in 2008. This provides aggregated data for Howrah district and urban areas of KMDA that helps to assess the nature of mobility pattern in the region. At the same time data is available from the Census 2011 on the modal share of work trips in Howrah district. These broadly define the dominant travel pattern in the region. As Howrah region is compactly built, which is a sustainable urban form, the average trip length is small. As much as 60 per cent of the trips are within the average distance of 3–4 km. Well-designed accessible and walkable roads and efficiently deployed public transport and para transit system can help to reduce vehicle usage and control emissions.

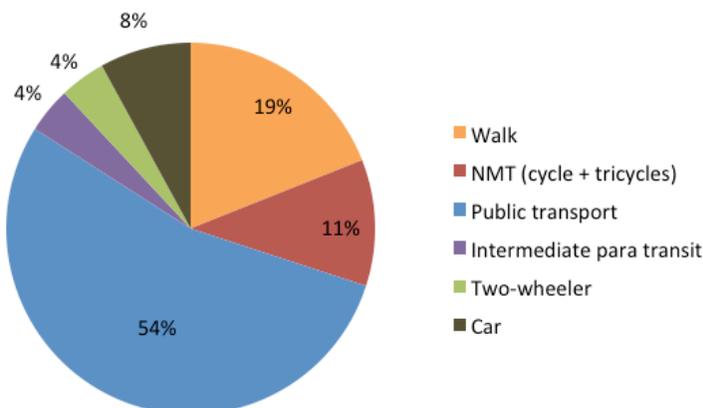
The 2011 Census data on work trips by mode shows that as much as 44 per cent of the daily work trips are by public transport and 40 per cent are walk trips. Only 13 per cent of the daily trips are by personal vehicles. This is an important opportunity to build sustainable transportation system and avoid congestion and pollution in the region (see *Graph 9: Modal split for Howrah district* and *Graph 10: Modal share in KMA region*).

Graph 9: Modal share of Howrah district



Source: Work trips by mode, Census 2011

Graph 10: Modal share in KMA region



Source: Traffic and Transportation plan for KMA region (KMDA 2008)

Transport system in Howrah

Rail based public transport system

Two major railway stations of Kolkata are at Howrah and Sealdah. Kolkata is well-connected across other Indian cities with well-linked railway network. The Eastern Railway division and South Eastern Railway division operates urban local suburban rail services and circular rail services to facilitate suburban passenger movement in twin city of Howrah and Kolkata. The rail lines in Howrah side are divided into the suburban railway (Eastern Railway lines; South-Eastern Railway line), and the metro railway line (under construction).

Kolkata Suburban rail: Kolkata suburban railway started in the year 1954 and is operated by Eastern Railway (ER) and South Eastern Railway (SER). Suburban rail network is extensive with 12 corridors and 105 railway stations serving KMA that includes Kolkata, Howrah, Barrackpore and few suburban areas. The Howrah line of Eastern Railways has a rolling stock of 12 coach EMU made by Jessop and ICF. As of 2006 it carried around 17 lakh passengers on a regular weekday.

Chakra rail/Circular rail: As a separate entity Eastern railway operates Circular rail within Kolkata and its suburbs, It's a division of the suburban railway, was built to ease road congestion that resulted with increasing population of the metropolis. Till date, the circular rail is an urban transport in a loop rail network, meant to cater to the central business districts (CBDs) of twin cities of Howrah and Kolkata. It is a 21-km loop with 13 stations and a terminal at Dum Dum Junction. It encircles the busiest trip generating area within Kolkata Municipal Corporation and is connected to Howrah Municipal corporation with ferry services in a multimodal transit set up. However, as of 2017, only partial loop is under operation with two-way services from Majerhat to Dum Dum and vice versa. Currently, there are 16 trains running with a frequency of 40–50 minutes. As of 2017, suburban railway and circular railway ferries around 5.7 lakh passengers, contributing to 16 per cent of passenger trips.

Ferry service

The ferry services are operated by Inland Water Transport Corporation (IWTC), a subsidiary of Transport Department, Government of West Bengal. It has a fleet size of 25, maintained by the West Bengal Transport Corporation (WBTC) and *Hooghly Nadi Jalapath Paribahan Samabay Samity* (HNJPSS). Currently, ferries are operated on nine routes from three depots. The ridership pattern has seen an increase from 4,500 in 2009 to 8,701 in 2017.

Bus transport

Bus is the primary mode of transport in Howrah. At present WBTC is responsible for operating bus services within the Kolkata metropolitan region which includes Kolkata, Howrah, Barrackpore, Bidhannagar, New Town and 21 other municipalities. Two major depots of CSTC (sub-group of WBTC) i.e. Howrah and Ghasbagan depots, located at Howrah are responsible for significant city bus operation across KMA.

However, the major share of bus transport in the region is catered by private bus services on routes notified by RTA. As of 2013, RTA had three category of bus routes within Howrah with a total of 4696 buses.

Table 5: Private bus services within Howrah, 2010

Category	No. of Routes	No of permitted buses
Within Howrah district	131	2018
Howrah-Kolkata (city)	148	2601
Howrah to long distance regional	14	77

Source: RTA, Howrah and Kolkata, 2013; Dey, T 'A profile of road transport development in Howrah district, West Bengal, India', 2013.

Paratransit

Paratransit is often seen as an informal response to fill the gap in formal public transport services. As a result, planning for formal transport is often seen as a means to curtail and reduce the provision of their services. But these systems play a complementary role to formal systems as well as in meeting enormous short distance travel demand that bigger formal systems cannot substitute. The variety of intermediate modes that are still available for mobility needs in the city are three-wheeler autos, yellow taxis, cycle rickshaw and battery operated rickshaw commonly known as a Toto or e-rickshaw. As per information from Howrah Municipal Corporation, which has recently instituted a system of registering e-rickshaws, as of October 2017, Howrah had around 6,846 e-rickshaws.

Auto: The order from Calcutta High Court on July 2008 mandated replacement of old fleet with environment-friendly four-stroke LPG auto rickshaws. Today, 100 per cent of three-wheeler autos plying within KMA use LPG.

Yellow taxi: Taxis are usually metered-cabs that ply within Kolkata Metropolitan Area. The meters—though digital—are generally out-of-date and there is a conversion chart to refer to while converting the meter-reading to the actual fare. The minimum value is Rs 25 for first 2 kms. Dedicated taxi stands are currently found at transit stations. Today, around three lakh passengers are ferried daily by 3,500 taxis. Though the yellow taxis operate on Bengal permit, they mostly limit operation within the boundary of KMA.

Cycle rickshaw and e-rickshaws: The past decade has witnessed a drastic reduction in the number of non-motorized transport vehicles. Their movement has been restricted only to few areas within Greater Kolkata. Currently, most rickshaw pullers in Howrah have resorted to driving e-rickshaws, however, there is no record or registration maintained for the number of e-rickshaws in the city. There hasn't been any license issued to rickshaw since 5 years to ply within KMA. However, the rickshaw pullers aren't evicted and are allowed to operate on their own. The fare structure is usually set by the rickshaw unions informally. The rickshaw generally offers small segment rides within its jurisdiction

While informal paratransit sector plays an important role in meeting travel demand in the city, it also provides livelihood security to low income people. This sector requires interventions to improve service quality as well as overall welfare of the service provider. This sector is partially regulated through permit system, and will require stronger deployment strategy and monitoring. All public transport nodes should include paratransit facilities. Inter modal integration of formal public transport, para-transit and cycle sharing should be within 50–200 m from each other. Paratransit pick-up and drop off points

should be planned within at least 50 m from bus and metro/rail stations. Paratransit should be available to all residents within a reasonable walking distance. This informal sector is vulnerable to the use of old and polluting vehicle technologies and dirty adulterated fuels. This demands special strategies to enable introduction of clean fuels like LPG or CNG and phasing out of old and polluting technologies. If needed, an incentive programme may be worked out for quicker transition to clean and advanced technologies. It is possible to bring paratransit under ITS monitoring through GPS systems to improve service quality.

Table 6: Number of IPT vehicles, 2017

Area	Cycle rickshaw [#]	E-rickshaw [#]	Auto ^{##}	Cab/taxi ^{##}
Kolkata	1,500		899	30,442
Howrah	500	6846	245	2,196
Bidhannagar	550		258	4,543

Sources: [#]Respective Municipal corporations (NB: cycle rickshaw's no. are in approximation); ^{##}PVD, Beltala, 2017

Explosive motorization and dependence on personal vehicles: Explosive motorization and growing dependence on personal vehicles is aggravating congestion that is further contributing to pollution and energy loss.

Walkability

Streets of Howrah are visibly unplanned in terms of street design elements. It was found that roads in Howrah lack adequate pedestrian facilities. Narrow roads, buzzing activities and traffic conditions force pedestrians to walk on high-risk mix traffic on congested roads. Of the many roads maintained by HMC, there is 749.71 km of surface roads and 20.73 km of unsurfaced roads, bringing the total to 770.4 kms. Average road width is 4.22 m.

Way finding signages are located at insignificant places leading to no or minimum function as per design standards. Streets within Kolkata and Bidhannagar municipal are relatively better equipped and are more walkable compared to Howrah. Kolkata and Bidhannagar already have an extensive network of footpaths and in several areas with good design. Moreover, inadequate on-street illumination, high activity level throughout the day and multiple infrastructure gaps do not make Howrah streets universally accessible and safe in all terms.

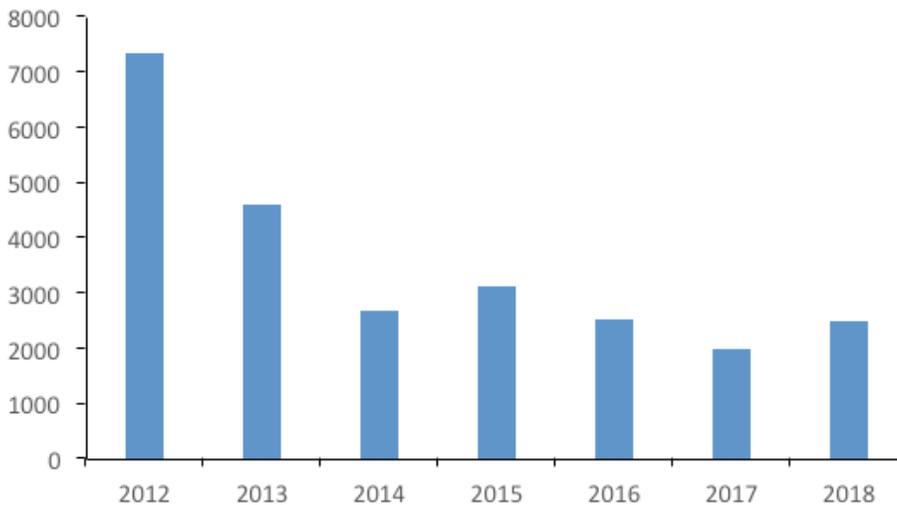
Road safety and traffic management

Howrah is a part of KMA where traffic management is subject of three separate Traffic Police organizations namely Kolkata Traffic Police, Howrah Police and Bidhannagar Traffic Police in a synchronized manner for the entire region. Due to the compact city structure traffic police of the city have prescribed time based one-way traffic management, where few selected roads connecting major Central Business District have uni-directional traffic manually managed by traffic police. To ensure safety, a wide variety of road safety measures and initiatives are under consideration. These include unidirectional traffic flow during peak hours; CCTV surveillance at 49 major junctions to detect traffic violation; automated number plate detection technology to issue challan; illumination across the city; automated traffic signal; installation of speed detectors at major roads. The police also conducts traffic management and safety awareness program for school students. Few other elaborate traffic management steps undertaken by Howrah city traffic police to facilitate smooth movement of vehicular traffic within the city are listed below:

- Identification of road hierarchy for movement
- Restriction of goods vehicle movement in peak hours
- Restriction of slow moving vehicles on main roads
- Deployment of manpower at major crossings and crucial cuts
- ANPR/RLVD cameras at 49 important crossings and traffic blinkers at 58 important locations. These automated systems can be monitored from traffic guard room, traffic control room and city control room
- 4 ANPR cameras and 9 RLVD cameras are installed in 10 locations; and total 945 CCTV cameras are installed in 225 locations
- Additionally, 6 Speed laser guns (SLG) are supplied by ADG Traffic office, Traffic HQ to different traffic guards for speed detection and taking action.
- Upgraded traffic police communication system
- Installation of signage removal of encroachments, hawkers, illegal parking, etc.
- Periodical upgradation of road marking/painting at major crossing on roads
- ROW extension by widening blacktop of roads
- Advocacy and campaigns with residents and school students on importance of road safety
- Strict implementation of traffic rules and regulations and issuing prosecution against defaulter drivers/owners of different types of vehicles

To check the growing pollution levels from moving vehicles in the city possession of valid Pollution Under Control (PUC) certificate in all vehicles plying within Howrah Police jurisdiction is checked for noncompliance and hence imposition of penalty. Implemented in October 2011, Howrah police have noticed significant improvement in number of vehicles following compliance over years.

Graph 11: Number of non-compliant vehicles recorded over past 9 years



Source: Howrah Traffic Police, 2019

Road safety, recording and reporting of road accidents is a subject of the traffic police for respective municipal areas. Majority of the roads within KMA are narrow and undivided, and remain congested throughout the day. Negligent driving behaviour and irregular road geometry throughout the region resulted in 4166 accidents in the year 2015. Ensuring road safety is critical to improve

share of public transport ridership and share of walking and cycling in the city to reduce emissions. It was found that the ratio of injured and fatal cases is 61:31 and 52 per cent of the accidents were recorded within internal city roads.

Table 7: Accident record within Howrah, 2018

	Total no. of accidents	Injured	Killed
Howrah	587	248	86

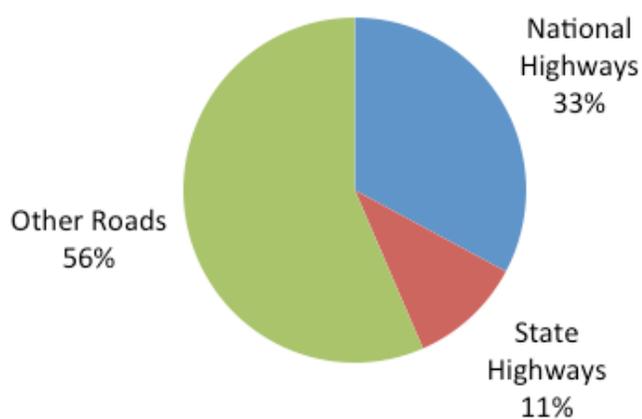
Source: Howrah Traffic Police, 2019

Table 8: Accident record within KMA, 2015

	Total no. of accidents	Injured	Killed
Howrah	415	318	97
Kolkata + Bidhannagar	3751	3329	422
Total	4166	3647	519

Source: Kolkata Traffic Police and Howrah Traffic Police, 2017

Graph 12: Distribution of accidents within Howrah

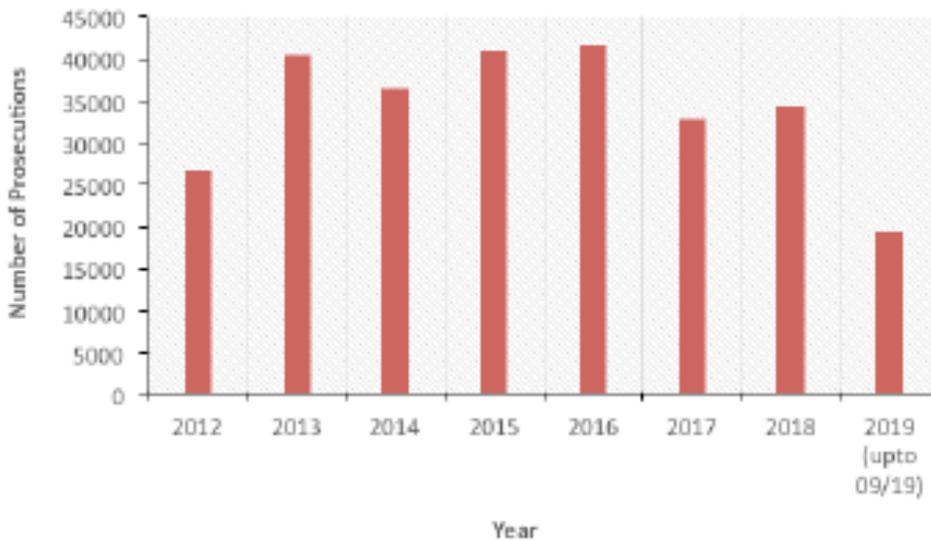


Source: Howrah Traffic Police, 2019

Parking for demand management

As of 2019, 33 places have been recommended under Howrah Police Commissionerate area for Fee Parking Zone. At these locations, 45 small-sized vehicle, 55 medium-sized vehicle, 115 large-sized vehicle, 170 two-wheeler, 445 bus/taxi/mini Bus and 185 commercial vehicle parking spaces are provided. In addition to that, 365 parking spaces have been provided for all categories of vehicles. Installation of “No Parking Zone” signage have also been done at important locations under the Howrah Police Commissionerate Area and prosecutions are issued on a regular basis against errant drivers/owners. Off-street parking within the municipality area is managed by third party in lieu of a legal annual fee to the municipal corporation but there has been no assessment of on street and off-street parking demand generated in the area. Information on city-wide parking management and pricing is limited.

Graph 13: Prosecutions issued against violation of ‘No Parking’ restriction



Source: Howrah Traffic Police, 2019

There is indicative information on the major transit location like Howrah Railway Station that has designated pick up and drop points located in such a way that there is greater convenience for passengers to access the railway platform. Entry of commercial vehicles is subject to surcharge on entering both railway station irrespective of pick up and drop off. At Howrah station, there is no car parking space for long durations, but pick up and drop off areas. The cab parking and pickup-drop off space is used by around 3,500 vehicles in a day, it has the capacity of accommodating 102 cars at a time and new Howrah station has a capacity of 120 cars at a time. Additionally there is a parking lot outside Howrah station that can accommodate 400 cars at a time; it has been leased to private agency. Parking fees and charges for commercial taxi services vary as per location and are given below:

Table 9: Car parking charge at major railway stations in Howrah

Sr. no.	Railway stations	Entry / parking fee (In Rs.)	
1	Howrah Railway Station	Old station area	200.00
		New station area	150.00
		Area outside railway station	50.00
2	Santragachi Railway Station	57.50	

Source: Various sources, 2017

There is no monitoring system for illegal parking across the city. A visual on ground assessment shows on-street parking has reduced the carriageways significantly in areas closer to Howrah Station road and towards Vidyanagar Setu.

Parking of heavy commercial vehicles: Movement of heavy commercial vehicles is generally restricted within Kolkata Metropolitan Area. Currently there are no government maintained parking locations for parking of heavy vehicles. However a proposal has been sent to the commissioner, HMC vide Memo No. 341/DCP/TR/19 dated 18/07/2019 for parking arrangement at two location (a) 3 community playgrounds - existing volleyball ground, boxing ground and Sarat Sadan Children parl; (b) basement of playground of Padmashree Sailen Manna Stadium/HMC. There are parking areas maintained by private owners that allow parking of heavy vehicles and trucks within premises in lieu of a certain fixed charges. These locations are closer to the city compared to government parking locations. As per a news report in 2014, the two truck terminals in Howrah were on the verge of closure as they remained empty for most of the time because trucks tended to violate imposed entry restrictions during the day. And it is very common to spot trucks and other heavy vehicles parked on highway and streets along the highway.

Overall, illegal parking is a component of revenue generation that is a function of traffic police and subject of Municipal Corporation. In a monthly basis, an average amount of Rs 3 lakh is collected from illegal parking and is deposited to the government treasury fund by Howrah traffic police. In Howrah, around 100 vehicles are fined for illegal parking daily. In the month of April 2018, a total of 2738 vehicles were fined by Howrah traffic police.

The City Mobility Pan proposes generation of off-street parking facilities in already built-up areas at locations of major vehicular and pedestrian concentrations with provision of underground parking in nearest parks or public open spaces and construction of multistoried parking structures having commercial activities. It asks for mandatory provision of public parking facilities in the development control regulations in cases of redevelopment of existing structures and should be supplemented with the introduction of incentives in FAR (floor area ratio). It also asks for construction of additional building on existing plots, redevelopment of markets, suburban station areas, etc. immediate provision of car parking facilities in the CBD areas of Kolkata and Howrah, provision of public parking facilities by the side of the highways/expressways at an interval of 3–4 km. If possible, it should be integrated with the petrol pumps. There is also a provision of parking facilities in Kolkata port area and NSBC airport area. As of today Howrah has 40 alternative fuel stations spread over 197.54 sq km area.

However, it will also be important to implement parking area management plan across all neighbourhoods to identify legal off-street and on-street parking areas while allowing enough space for footpaths and for emergency vehicles to pass

easily, and not violate green areas. Effective parking management plan for both private and heavy commercial vehicles should be strategic enough such that in future the community services and playground need not be made into parking. Decreasing of open community areas has direct effect on deteriorating health. This along with effective parking pricing and issue of parking permits will control demand for parking and usage of personal vehicles.

2.3 Strategies to reduce tailpipe emissions

Emissions standards for new vehicles: As per the national roadmap, West Bengal has implemented the Bharat Stage IV (BS IV) emission norms for new vehicles in April 2017 though it was implemented in Kolkata in April 2010. It is scheduled to introduce Bharat Stage VI (BS VI) norms and fuels in April 2020. The BS VI norms are slated to reduce emissions from new vehicles by 80–90 per cent. On-road fleet will also benefit from the introduction of clean BS VI compliant 10 ppm sulphur fuels by April 2020. These emissions standards will come with stronger real-world emissions requirements and management to ensure that vehicles remain low emitting on road. As these new generation vehicles will be equipped with more advanced emissions control system, commensurate improvement in emissions inspection and maintenance will be needed at the city level.

Emission management of on-road fleet: With continuous ageing of vehicles, keeping vehicles low emitting throughout their lifetime on road will require multiple strategies including in-use emissions inspection, monitoring of real world emissions, phase out of old vehicles and scrappage, clean fuel substitution and control of heavy duty traffic.

PUC programme: The current in-use emissions inspection programme is the Pollution Under Control Certificate system. Currently, under this programme idling carbon monoxide and hydrocarbon (HC) concentrations are measured in petrol vehicles and smoke density is measured in diesel vehicles. The status of implementation of lambda tests as per the 2004 notification of the Ministry of Road Transport and Highways (MoRTH)—that is needed to maintain the optimum air to fuel ratio for proper functioning of catalytic converters in petrol cars—is not yet available. Ground assessment shows that there are quality control challenges with regard to the testing methods, calibration of equipment and overall compliance with the programme. Strategies such as high penalty under the Central Motor Vehicle Rules are needed to ensure full compliance.

As the PUC centres are decentralized and limited they need frequent inspection and robust audit programme to ensure that credible and authentic tests are being done. Such steps have been initiated by the Department of Transport. Steps are needed to further reform the system and also expand the online networking of PUC centres to link with centralized data server for proper audit.

On-road smoky vehicle inspection: The city needs strong on-road smoky vehicle inspection to identify visibly polluting vehicles and remove them from roads for inspection and repair. A small number of grossly polluting vehicles contribute significantly to the pollution load from on-road vehicles. If these can be identified and addressed substantial emissions reduction is possible.

Advancement in on-road emissions monitoring: Introduction of BS IV and BS VI vehicles with more advanced emissions control systems will require advancement in emissions monitoring of on-road vehicles. The current PUC

programme will not be adequate for that. The Ministry of Road Transport and Highways has already sent out an advisory to the State Transport Departments that all vehicles manufactured after 2013 that are equipped with On-board Diagnostic System (OBD) should be checked for malfunctioning light on the dashboard of the vehicle when they come for PUC check. If the light is on the vehicle should be returned for proper check in workshop and repair. This needs to be implemented in PUC centres immediately. In addition, this system can be further upgraded in PUC centres to check if the OBD itself is functioning properly or has been tampered with. The OBD in vehicles has the capacity to sense and record the emissions performance of the vehicles to alert the driver if there is any anomaly. While full scanning of the OBD for such diagnostic exercise can be done in the designated workshops to be identified, PUC centres can do simple tests to ensure the OBD is functional. This kind of upgradation has become important after the introduction of BS IV and upcoming BS VI emissions standards that will bring more advanced and sophisticated emissions control technologies that cannot be adequately monitored through PUC programme that was designed for older generation of vehicles.

Similarly, as being discussed in Delhi, the on-road fleet will require more rigorous monitoring for real world emissions to ensure that vehicles do not emit more than they are designed to emit. This may require selective and pilot introduction of on-road remote sensing monitoring to check the emissions as the vehicles are passing by to catch the most grossly polluting vehicles and characterize the fleet emissions.

Regulating movement of heavy duty vehicles: Yet another area of intervention is the heavy duty truck movement through cities that can contribute hugely to urban pollution. Usually, cities restrict truck movement during the day and allow them to pass through or do loading and unloading during night. But explicit intervention is needed to design highway alignment in a way that they bypass the highly populated cities and do not cut across. Truck movement and dust control from loading and unloading will be of special concern in industrial cities and mining areas and will require spatial planning to reduce exposure.

Phasing out of old vehicles: As of now cities in West Bengal except Kolkata do not have age restriction on vehicles. Vehicles of and more than 15 years age are not prohibited from plying within cities. After crossing the 15 years registration time frame, these vehicles are not removed but are re-registered for a span of another five years. The non-attainment cities require a phase out plan either through age restrictions or tax policy or restrictions on their movement in city centres. The phase out plan will need to be supported by a scrappage policy especially for the old commercial vehicles and buses. Currently, the Union Ministry of Road Transport and Highways is also working on a national scrappage policy. But state level policies are also important for scrappage infrastructure.

1.4 Brick kilns

There are large number of brick kilns within close proximity of Kolkata and Howrah that can influence the air quality of the two cities. The Kolkata Metropolitan Area houses four major brick clusters which are situated in South 24 Parganas, North 24 Parganas, Howrah and Hooghly. These clusters consist of approximately 1700 units. 182 units out of these 1700 units are operating in Howrah district. The Howrah Brick Cluster houses relatively lower number of units. The cluster spans over two zones—Sankrail and Shyampur. Sankrail has 13 units and each unit has a production capacity of 15 lakh bricks per season. Shyampur has 169 units, with each unit's production capacity being 22 lakhs per season. Close to 97 per cent of these kilns operate on the induced high draft kiln technology.

Across the state of West Bengal, there are a large number of old FCBTK (Fixed Chimney Bull Trench Kilns) design kilns. Many of these have been operational for decades, and are in urgent need of upgrading to allow for infrastructure for monitoring—platform/chimney-based stack monitoring of emissions. However, West Bengal has a history of being one of the pioneer states in terms of implementing Rectangular Zig-Zag designs for brick kilns since the 1980's. It has already taken the lead to get large number of brick kilns to move from old and polluting kiln technologies to induced high draft kiln (Induced Fan Rectangular Zig-Zag setting) technology that are much cleaner. About 68 per cent of the existing units in this region employ induced high draft kiln technology. However, only about 10–15% of the total brick kilns have employed Rectangular Zig-Zag setting designs for kilns, along with induced draft chimneys.

The per unit brick production capacity ranges from 15–25 lakh bricks per season. The brick manufacturing season spans from October to June, thereby, covering the winter months which witness high air pollution levels. During severe smog episodes, the conventional kilns with old technologies need to be shut down while ramping up the process of complete transition to improved kiln technologies.

1.5 Hot-mix plants for road construction and cement batching

Kolkata Municipal Corporation, as well as the Kolkata Metropolitan Development Area have been witnessing a boom. Greenfield projects, in terms of commercial, residential and mixed land-use area development, as well as expansion of existing areas has led to the intensive increase in emissions emerging from concrete batching as well as from asphalt mixing plants, known as hot-mix plants.

The Eastern Zone bench of the NGT took notice of the emissions emerging from these hot-mix plants, and in a series of orders dated 18 September 2018 and 01 October 2018, banned the operation of all Hot Mix plants within Kolkata and Howrah. The order also asks the state government, KMC, and the WB PWD to 'adopt more environment friendly and cleaner methods for the purpose'. The KMC also moved the NGT on 01 October 2018 to get a 4-month window to continue to operate the KMC run hot-mix plants within Kolkata. The deadline of 31 January 2019 has been set for these plants by the KMC to finish the ongoing repair of roads across Kolkata and Howrah. However, it must be noted that the longer term plan of the KMC for its hot-mix plants is to relocate these to areas such as Dum Dum and Rajarhat that are outside the jurisdiction of KMC. While this may suffice for the purpose of the NGT order, the emissions from these re-located plants, along with others within the KMDA will continue to affect air quality in the Kolkata-Howrah airshed. The KMC has begun implementation

of this order, through the constitution of a panel of experts from WBPCB, IIT-Kharagpur, KMDA, Hooghly River Bridge Commissioners (HRBC) and KMC, with a mandate to monitor emissions from existing hot-mix plants, and suggest technical, technological and other measures to reduce the emissions from this sector.

1.6 Household emissions

The 2011 census data for the districts of Kolkata and Howrah shows that approximately 35 per cent of urban households do not have access to LPG or PNG connection and resort to using dirtier cooking fuels like firewood, crop residue, coal, charcoal, lignite, kerosene and other unknown fuels. Almost 50 per cent of both urban and rural households in Howrah do not have access to LPG or PNG connections.

1.7 Area sources: construction activities, construction and demolition waste, open eateries, and road dust

These are largely dispersed pollution sources across the city and include a wide variety of sources including construction activities, construction and demolition waste, road dust, and open eateries. These are small-scale and in many cases informal in nature but, cumulatively, they add up to contribute substantial parts of the ambient pollution concentration.

1.8 Restaurants and open eateries

A large number of open eateries and restaurants in Howrah that often use dirty coal are a substantial cause of concern. The data base on this is weak and needs more on-ground survey for a robust estimation. Way back in 2005, the ADB study accounted for 325 bakeries and 857 restaurants within KMA. These numbers are expected to have increased substantially. The bakery ovens have traditionally employed LDO and firewood in their operations. Restaurants have relied on cheap coal and, to some extent, LPG as their cooking fuel. According to the data provided by HMC, there are 2,614 eateries which are using unclean fuels such as coal, kerosene, diesel, wood, etc. More than 70 per cent of the eateries use coal whereas others use mostly kerosene. Some eateries also use gas as a fuel but they are few in number. It has been reported that according to the draft source apportionment study carried out by the National Environmental Engineering Research Institute (NEERI) contribution of open eateries and vehicles in Kolkata to particulate pollution is among the highest and nearly equal. This means this will have to be the priority sector for interventions.

1.9 Solid waste management

The information on municipal solid fuel generation in Howrah is extremely limited. The absence of decentralized waste management practices besides traditional dumping leads to massive open landfills which are not just an aesthetic issue anymore. It is exposing residents of the city to toxic, lethal smoke fumes. Decentralized waste segregation, collection and recycling will have to be the urgent focus of action plan to reduce toxic risk. Any instance of natural burning on the landfill site is reported to the municipal corporation. Open burning of waste is the common practice in the city. The following roadmap may be implemented for management of municipal solid waste. Further, successful case studies of cities like Indore and Ambikapur may be studied to identify potential synergies.

1. Identification of clusters of Municipal bodies: A cluster of municipal bodies may be formed with a common waste processing facility. This will bring down costs considerably and also do away with requirement of land in every municipal body

2. The cluster approach would entail additional transportation of solid waste for some municipal bodies
3. Till the cluster approach is implemented, construction of community bio-gas plants and compost plants should be encouraged.
4. Create an ecosystem of start-ups based on waste to energy projects (capacity{waste utilization + power generation}, calorific value and type of waste used)

2.10 Construction activities

To address the problem of pollution from this sector, West Bengal has notified building and construction projects with more than 20,000 sq m of built-up area as an orange category industry requiring additional scrutiny and environmental control including air pollution control. In 2009, the West Bengal Department of Environment, in consultation with the West Bengal Pollution Control Board, had issued directions that laid down the preventive measures to curb emissions from construction sites. Developers and contractors who fail to abide by these statutory norms would be subjected to legal action or pollution charges under law. These preventive measures are applicable to all building and construction activities. These are also more detailed and effective than the ones notified by CPCB as part of their 2017 Guidelines on Environmental Management of Construction and Demolition (C&D) Wastes. However, CPCB has further issued directions to all SPCB's that include guidelines and dust mitigation measures for the implementation of the Construction and Demolition Waste Management Rules, 2016 and has made this a part of consent management for construction projects. SPCBs are required to direct local authorities granting permission for C&D activities to ensure compliance with the rules.

The local authorities, i.e. municipalities and panchayats have been made responsible for implementation of these preventive measures. While dust management practices are being observed at many construction sites, a lot of sites are also seen flouting these norms. Uncovered piles of rubble and construction debris can be seen along the Eastern Metropolitan bypass. Thus, proper enforcement can help to address this problem significantly.

2.11 Construction and demolition waste

With the construction boom and on-going urbanization, generation of construction and demolition waste is on the rise in the KMA but there is no scientific estimate of the quantum. CPCB, in their 2017 Guidelines on Environmental Management of Construction & Demolition (C&D) Wastes, report that Kolkata generates 1,600 tonnes of C&D waste annually. This is different from the KMC estimate of 40–45 tonnes daily. C&D waste is an inert waste but has wide range of ecological fallout. Indiscriminate handling and disposal of it contributes to road dust generation apart from worsening local air quality. About 14 per cent of road dust in the city is attributed to C&D waste in the 2005 source apportionment study. C&D waste can easily be recycled and brought back to substitute virgin building material required for construction which are in short supply. State policy on Construction and Demolition waste management is under preparation as per C&D Guideline 2016.

2.12 Suspended road dust

Unpaved and dug up roads, and suspension of dust due to vehicular movement are a significant source of particulate matter in Howrah.

As far as the baseline policy action is concerned, urban local bodies have an ongoing programme of street and pavement development. But these will

have to be made more holistic and widely implementable in terms of paving, street-scaping, vegetative barriers and manual and mechanical road sweeping without compromising the pedestrian and vehicular movement. The street design guidelines can holistically help to address these co-benefits. However, it is more important that for any infrastructure project all the concerned agencies need to be made responsible and accountable to adopt dust control measures in terms of keeping dug earth covered, sprinkling of water and also responsible for restoring the place according to the predefined street design guidelines within a specified period after completion of projects.

2.13 Crop fire

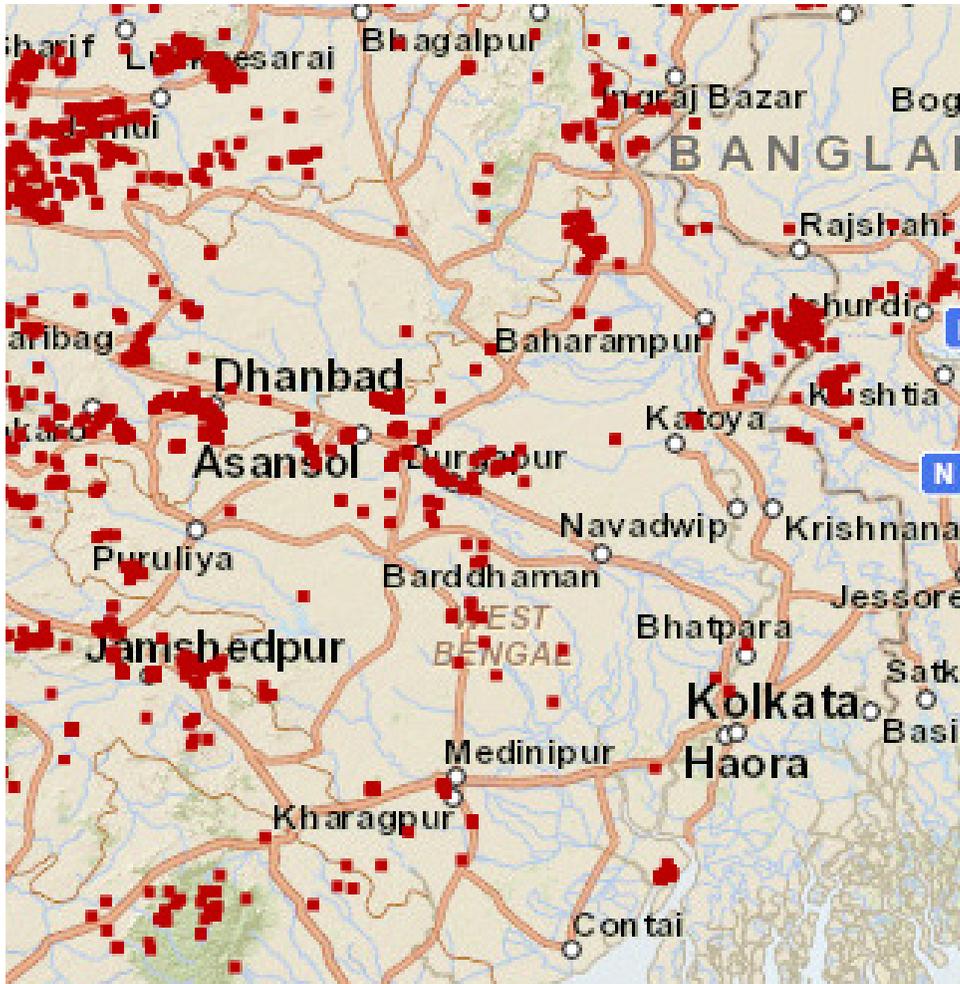
Urban air quality of cities is also impacted by the pollution at the regional level due to trans-boundary movement of pollution. From that perspective any large-scale open fire in the region can have serious impacts. While the impact of the problem of agricultural stubble burning or crop residues is well known in northern India, it has not been properly evaluated in other parts of India. There is also the aspect of forest fire in the region that requires scrutiny. Pollution from such fires is seasonal and episodic.

The satellite image of NASA shows large numbers of open fires in West Bengal in the months of October and April. While fires in March–May may be attributed to seasonal changes, as well as to naturally occurring forest fires. During this month, the geographic distribution of fires also changes, with many more fire incidences detected in central and central-eastern West Bengal, coinciding with river flood plains. The timing of these fires also coincides with deterioration in the urban air quality of cities in West Bengal, which may be within the influence zone of these fires.

Such incidents are expected with growing mechanization of agriculture. The harvesters leave behind stubble on the field. As farmers find it expensive to hire labourers to cut it, easiest way to dispose them off is to burn them. In northern India—Punjab, Haryana and Uttar Pradesh—this problem is being addressed through in-situ management in which incentives are being given to the farmers to procure machines that can help to mulch the stubble while sowing the seeds. This does not require burning and also addresses the short time window that the farmers have to sow the next crop. In addition to this several business models for reuse and recycling of straw are also being thought of that include power generation, pellets for industrial boilers, and other products. But this matter will require immediate attention.

In the case of Northern India, special policies are in place to incentivize farmers to adopt technologies that help to mix and mulch the crop residue to soil instead of burning. Methods of utilizing this agricultural residue as a feedstock for other commercial ventures are also being explored. It is possible to introduce similar models to West Bengal which can prevent the problem of crop burning and open fire. Even farmers will have to be sensitized and made aware that—as studies of Agricultural Research Institute, Pusa in Delhi have shown—such large-scale burning actually destroy the micro-nutrients in the soil and affects soil fertility.

The following snapshot showcases the cumulative fire incidences/ spots cumulative during April 2019.



Source: NASA Firemapper

PART II

COMPREHENSIVE CLEAN AIR ACTION PLAN (CAP) AND GRADED RESPONSE ACTION PLAN (GRAP)

Comprehensive Clean Air Action Plan (CAP)

Against the backdrop of the challenges outlined in each sector, this pollution source-wise comprehensive action plan has been developed for industrial town of Howrah. Keeping in view the air pollution reduction targets in the city detailed strategies have been identified to indicate the nature, scale, scope and depth of action needed for effective reduction to make an impact over time. In view of this, instead of listing only broad action points, detailed indicators and action points have been included for all sectors to guide implementation.

This plan has integrated and built on the on-going action and action plans of the state government in each sector that are already underway. Action plan has also been improved further based on emerging good practices. In several sectors good practices have emerged that need to be leveraged and aligned to meet the clean air objective. This creates a good template for upscaling and replication in other cities. This action plan has integrated all ongoing efforts to chart the roadmap.

Special care has been taken to ensure that sufficient indicators are included in the plan itself to indicate the nature and scope of the strategies outlined for each sector that are needed for implementation to make an effective impact. For instance, often it is not clear how different aspects of transportation and urban planning are linked with air pollution control. It is important to ensure that clean air action plan ensures convergence of planning for road building, public transport infrastructure and non-motorized transport planning to guarantee that people-oriented design is integrated all across to prevent lock in of pollution in the infrastructure itself. Similarly, actions in renewable energy sector, urban forestry and a plethora of clean energy and industrial emissions management strategies have been integrated.

Alignment of inter-sectoral action will be critical to leverage the available resources of funding for maximum impact. In all sectors—transport, industry, power plants, construction industry, municipal solid waste management, air quality monitoring, road building and traffic management—budgetary resources have been earmarked for investment, or, investments from other private or bilateral sources are coming in. If these investments are better informed and aligned with this clean air action planning process and objective, significant change at a scale is possible.

This plan also opens up the opportunity for developing fiscal strategies based on polluter pay principle to generate additional resources for funding of the plan. For instance, in other cities such as Delhi, fiscal measures such as environment compensation charge on trucks, big diesel cars and diesel fuel have helped to create dedicated funds that are now available for pollution control efforts. Such measures can be adopted to top up the resource needs in addition to the state and central government funding. In areas where the action depends on private sector participation and investments the detailed guidelines under this plan can guide such investment. This plan has identified the agencies responsible for implementation of each action point and has also indicated the timeline for implementation. This can be monitored for reporting and compliance.

Graded Response Action Plan (GRAP)

Based on the National Air Quality Index Graded Response Action Plan has been framed for daily response to air quality changes. This has predefined the set of measures to be taken for different air quality categories—satisfactory, moderate, poor, very poor, severe, and emergency. Once notified these measures will come into force automatically. Available data shows that in most non-compliant cities, barring hotspot areas in industrial cities, the daily levels vary between moderate to poor; sometime touching the very poor level. The GRAP measures will be implemented accordingly. GRAP also includes the advisory for people to take precaution for self-protection.

For proper implementation and oversight the high-powered committee will coordinate with the city level authorities in each of the six non-compliant city for direction, compliance monitoring, and reporting. Each concerned department in a city will appoint a high level officer as a nodal official for coordination, implementation, and periodic reporting.

COMPREHENSIVE CLEAN AIR ACTION PLAN (CAP)

Source-wise clean air action plan and compliance strategy for Howrah to meet clean air standards. The following table indicates the short, medium, and long-term action along with agencies responsible.

1. AIR QUALITY MONITORING AND ASSESSMENT

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
Short-term priority action				
1.1	As per the IS:5182 (Part 14), 2000 on Recommended minimum number of stations, population-wise (also mentioned in Guidelines for Ambient Air Quality Monitoring, CPCB, 200329) Howrah fulfills the criteria of minimum number of stations. Howrah has a population of 10,77,075 and based on the CPCB criteria, it has three CAAQMS and four manual stations. Two more CAAQM stations are to be added. Among all twelve pollutants to be monitored, special focus is needed on PM2.5 and ozone monitoring. Use air quality sensors at probable hotspots to complement air-quality monitoring (based on CPCB/MoEF&CC guidelines).	WBPCB supported by Central Pollution Control Board (CPCB)	6-12 months	Regular monitoring cost
1.2	Use air quality information provided by satellite-based monitoring to complement ground based air quality monitoring and also unmonitored areas. This is useful to identify agricultural burning/forest fires, regional pollution, etc. that have impact on urban air quality.	WBPCB, CPCB, IMD, IITM, Pune, MoES	6-12 months	To be finalized
1.3	Develop capacity for pollution forecasting for implementation of graded response action plan. This will also require monitoring of weather data. Extend programs like SAFAR for Howrah.	MoES, IMD, IITM, Pune, Department of Environment, WBPCB supported by CPCB	6 months to 1 year	To be finalized

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
1.4	Set up daily air quality public information dissemination system based on National Air Quality Index and health advisory. Further develop online reporting of daily and annual data for all pollutants and pollution forecasting on SPCB website. Set up system for dissemination of information to public through website and local media.	WBPCB, CPCB, IMD	6 months to 1 year	Regular Activity
1.5	NEERI has conducted source apportionment and emission inventory study to capture source-wise contribution and seasonal variations in source contribution. The carrying capacity measurements are to be carried out as well. The WBPCB is to select a relevant institution to commission the study. Also to assess regional impacts by setting up a mechanism to assess trans-boundary emissions.	WBPCB, Department of Environment	1 year	3 crore
1.6	The National Clean Air Programme (NCAP) from the MoEF&CC has recommended rural air quality monitoring. Air shed approach to monitoring can help to address this.	WBPCB & CPCB	1-2 years	1.6 crore
1.7	Assess application of low cost sensor based monitors in areas that are not being monitored to create baseline local data to inform local area action.	WBPCB & CPCB	1 year	To be finalized
Long-term action				
1.8	Research studies including emission inventories and source apportionment, health impact studies, exposure impacts, carrying capacity assessment of air shed and regional impacts, hot spot assessments and other relevant studies may be undertaken to further refine inform the action plan: Government to support research works/scientific studies by academic/research institutions. Expertise will be sought from various institutions to develop protocols for assessment of the research proposals.	WBPCB, DoE, CPCB, West Bengal State Council for Science and Technology,	2 years	1.5 crore
1.9	Database management for implementation of action plan: Data collection, sharing and analysis protocol must be set up for effective implementation of clean air action plan. Prepare detailed data protocol for systematic recording of emissions data from industries and other sources.	WBPCB, DoE in coordination with all relevant departments	1-2 years	Regular activity

2. INDUSTRIES

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
2.1	Implement SOx and NOx standards notified by MoEF&CC on January 29, 2018 for 16 categories of industries in and around the city. Strengthen and implement strategies needed for critically polluted industrial areas. Strengthen the current siting policy for industries to be notified in future, in order to address Howrah-wide air quality issues.	WBPCB	6 months
2.2	Implement existing standards for PM and ensure compliance through regular testing & CEMS enabled monitoring (See action 2.4). Also take precautions for minimizing fugitive emissions through the preparation of a checklist for industrial zones and units specific to each type of industry. Carry out regular inspections.	WBPCB, Department of ICE and MSMA	3 months
2.3	Prepare a clean fuel policy and provide incentives for clean fuels for the state: for this identify approved and non-approved fuels. For this notify a list of approved fuels. Promote relatively cleaner fuels like gas (Coalbed Methane, natural gas, etc.) and electricity. Discourage fuels with very high sulphur and heavy metals like furnace oil, pet coke, tyre oil, etc. (except where it is used as feedstock like cement). Need for a favourable taxation and pricing policy to make cleaner fuels more competitive. Incentivize replacement of boilers to switch to cleaner fuels. Clean fuel strategy needed for small and medium-scale units with nominal or no emission control system.	WBPCB, Department of ICE and MSME	6 months
2.4	Identify the units that need to install Continuous Emission Monitoring System (CEMS) across all targeted and applicable polluting industries: Ensure calibration and working of CEMS in all industries in the urban airshed or area of influence and provide information to monitoring agencies to take appropriate actions. Specify the mechanism for quality control and quality assurance of CEMS data and ensure that data is available online and the reported data is compared with applicable prescribed limits and not the older standards. Compliance checking to be enforced routinely to prevent tampering with the CEMS. This needs to be done for all sectors including sponge iron units, cement units, iron and steel industries, rice mills and jute mills.	WBPCB, Department of ICE and MSME	6 months
2.5	Identification of cumulative impact of industrial emissions such as total load from a specified area. Prescribe more stringent pollution control action for each type of industry. For instance, different actions for sponge iron units and rice mills.	WBPCB, Department of ICE and MSME	6 months
2.6	Identification and implementation of fugitive emission control measures in ancillary units, material transfer and handling and emissions during industrial processes. Informal industrial units will require stringent monitoring. Hold quarterly inspections.	WBPCB, Department of ICE and MSME	6 months
2.7	Enforce restrictions on operations of intensively polluting industries within urban airshed zones during high pollution periods. Upgrade all existing air pollution control devices.	WBPCB, Department of ICE and MSME	6 months
Medium-term action			
2.8	Prepare and implement action plan specific for small and medium-scale industrial units.	WBPCB, Department of ICE and MSME	1 year
2.9	Identify and implement local area action plan for pollution hotspots for strict enforcement of air pollution control measures locally. Build schedule for inspection of areas of concern and reporting.	WBPCB, Department of ICE and MSME	1 year

Sr. no.	Action points	Agency responsible	Timeline
2.10	Strengthen the current siting policy for industries to address Howrah wide air quality problems. Restrict expansion and diversification of old polluting units that are near residential areas until robust pollution control devices have been installed and are routinely inspected.	WBPCB, Department of ICE and MSME	1 year
2.11	Training and awareness program for onsite emergency preparedness and environmental issues for industrial workers.	WBPCB, Department of ICE and MSME	1 year
2.12	Construction of paved roads around all major industrial estates. Installation of dust suppression system. Provision for water sprinkling and dust mitigation.	WBPCB, Department of ICE and MSME, ADDA	1 year
2.13	Development of adequate green belt around all major industrial estates by planting at least 1000 saplings.	WBPCB, Department of ICE and MSME, ADDA	1 year
2.14	Inspection of bag filters wherever installed, replacement of older bag filters and overhauling of ESPs and water scrubber system where applicable.	WBPCB, Department of ICE and MSME, KMDA	1 year

3. BRICK KILNS, HOT-MIX PLANTS AND STONE CRUSHERS

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
3.1	There are about six brick kilns in close vicinity of the city. Enforce restrictions on operations of brick kilns within urban airshed zones during high pollution periods; allow only those brick kilns that comply with rectangular zig-zag design with induced draft or those with improved technology. Initiate phasing out of traditional brick kilns.	Dept. of land and Land Reform WBPCB, KMDA, HMC, Department of MSME	6 months
3.2	Relocate and discourage any hot-mix plants within Howrah boundaries. Shut down small and mobile hot-mix plants.	HMC, WB PWD, NHAI and other road operating agencies	Immediately
Medium-term action			
3.3	Identify and convert all brick kilns to rectangular design zigzag technology. If any FCBT natural draft kilns are found they need to be converted to induced draft kilns with rectangular zigzag design.	Department of Land and Land Reform, WBPCB, CPCB, ICE and MSME	1 year
3.4	Prescribe design specifications for improved kilns and ensure compliance checking of conversion. Ensure provision of infrastructure in terms of viewing platform and chimney emission testing point for compliance.	CPCB, WBPCB, Department of ICE, MSME	1 year
3.5	Establish a protocol for using cleaner fuels & technology for asphalt mixing and minimizing the number of hot-mix plants	MoRTH, HMC, WB PWD, NHAI and other road operating agencies	2 years

4. ACTION TO REDUCE VEHICULAR EMISSIONS

Sr. no.	Action points	Agency Responsible	Timeline
4.1	Emission And Fuel Quality For New Vehicles: Ensure on-schedule implementation of BS VI fuel and emission standards on April 1, 2020. Ensure that only BS VI compliant vehicles are registered from this date. Supreme Court order of October 24, 2018 has directed that no vehicle that is not BS VI compliant can be registered from April 1, 2020. Fully prepared to comply the order of Hon'ble Apex Court.	Transport Department	1 year
4.2	ALTERNATIVE CLEAN FUEL POLICY FOR VEHICLES		
4.2.1	Expand gaseous fuel programme for vehicles: Move auto rickshaws and local taxis to run on LPG/CNG – as applicable and available. Restrict and replace diesel three wheeler & taxi fleets within HMC area. Expand gaseous refuelling infrastructure for delivery and use. GAIL is expected to expand natural gas to West Bengal, prepare roadmap for Howrah for the same. Around 133 LPG driven auto rickshaws operate in Howrah City.	Transport Department, Department of ICE, MoPNG, Traffic Police	1-2 years
4.2.2	Target medium and short term goals for electrification of new vehicles fleet in specific segments using a mixture of mandates and subsidies. Align with state level policy on electric mobility and include some of the key parameters for eg. <ul style="list-style-type: none"> - Provision of additional state subsidy for procurement of commercial electric vehicles - 100% Exemption of duty/tax on electricity tariff for an initial period of 5 years for EV manufacturers (vehicle and battery) - Seek to drive rapid adoption of battery electric vehicles in a manner that they contribute to 25% of all new vehicle registration by 2023. - Build on policies of the central govt. to make West Bengal a hub of electric mobility. - Currently about 2500 e-rickshaws/totos are operating within the city limits. Electric Buses are to be introduced in the city within the next one year. To facilitate rapid adoption of Battery Electric Vehicles in commercial segments, it is being contemplated to do away with permit system and also exempting 100% of motor vehicles tax for initial 5 years. - Build requisite infrastructure 	Transport Department, Department of ICE, MoPNG, Department of Power, NES, Central Policy guidance from DHI and Niti Ayog	1 year
4.2.3	Identify and notify commercial areas with high footfall and good public transport and goods transport connectivity to pedestrianize supported by zero emission battery-operated vehicles: Priority may be accorded to battery-operated para-transit as feeders and for last mile connectivity. Ensure organized deployment to reduce congestion. Designated parking spaces for commercial electric vehicles with exempted parking fees for EVs. Legalize domestic charging of e-rickshaws: to control power theft due to illegal charging and eradicate informal proliferation of units.	Transport Department, Department of ICE, MoPNG, Department of Power and NES, Central Policy guidance from DHI and Niti Ayog	1 year
4.2.4	Feasibility of the potential of generating biogas from waste and sewage to run buses in cities to be explored.	Transport Department, Department of Energy, Oil marketing companies	1 year
4.2.5	Introduce favourable fiscal measures to promote clean fuels and zero emission vehicles such as reduction in road tax.	Transport Department, Department of Power and NES and Finance	1 year

Sr. no.	Action points	Agency Responsible	Timeline
4.3	EMISSION CONTROL MEASURES FROM ON-ROAD VEHICLES		
4.3.1	Strengthen periodic auditing and over-sight of PUC centres and calibration of equipment and third-party checks. At present there are 51 PUC centres operational in Howrah City	Transport Department	Ongoing
4.3.2	Link PUC certificates with mandatory third party insurance for vehicles or any other method to ensure 100 per cent compliance. Develop a mechanism for ensuring that no vehicle is allowed to ply without valid PUC certificate. Any kind of transaction with respect to the motor vehicle done in e-Vahan is allowed only if the third party insurance is complied with.	Transport Department, MoRTH	Immediately
4.3.3	Enforce PUC programme based on universal linking of PUC centres with remote server and eliminate manual intervention in PUC testing. Implement testing of all notified emissions parameters including Lambda testing for petrol cars as notified by MoRTH in 2004. Effective since 1st April, 2019. Upgrade PUC centres based on PUC norms for BS VI vehicles.	Transport Department	Immediately
4.3.4	Upgrade in-use emissions testing for petrol and diesel vehicles by using additional methods of screening such as remote sensing.	Transport Department, MoRTH, ARAI	1 year
4.3.5	Advancement of the system: Integrate on-board diagnostic (OBD) system fitted in new vehicles with vehicle inspection. As per the MoRTH advisory PUC centres have to check malfunctioning indicator light on dash boards of vehicles. If the light is found on, vehicles to be sent back for testing in authorized workshops. Additionally, PUC centres need to check if the OBD is functioning properly. Also keeping in view that BS VI vehicles will roll from April 2020, there is need for system upgradation for more effective screening of on-road vehicles. It is recommended that remote sensing measurements of on-road emissions be introduced. Carry out training programmes and auditing of PUC centres to check for preparedness of BS VI norms.	Transport Department	6 months-1 year
4.3.6	Enforcement against visibly polluting vehicles: remove them from road, impose penalty, and launch extensive awareness drive against polluting vehicles.	Transport Department, Traffic Police	6 months-1 year
4.3.7	Set up modern centralized vehicle inspection centres for upgraded emissions, fitness and road worthiness tests for commercial vehicles and diesel vehicles. One pilot project is under advanced stages of development at Behala, Kolkata. It is contemplated to develop another such automated vehicle testing centre in Howrah.	Transport Department, MoRTH	1 year
4.4	Phase out old vehicles and develop a state vehicle scrappage policy: Phase out old vehicles with the help of age cap and age linked road tax policy. Set up scrapping infrastructure for scientific dismantling and disposal of old vehicles. Set up recycling units that are authorized with proper guidelines and integrate the current informal scrapping units. 18,332 commercial vehicles which were more than 15 years old were seized/ scrapped/ physically thrown out of the city limits of Howrah. The process of scrapping the vehicles is followed as defined in the MV Act and after scrapping, the registration number of the vehicle is cancelled in the system	Transport Department, MoRTH, CPCB	1 year

Sr. no.	Action points	Agency Responsible	Timeline
4.5	FREIGHT TRANSPORTATION		
Short-term action			
4.5.1	Adopt freight master plan to organize freight movement and logistics.	District and local administration, Howrah Municipal Corporation (HMC)	Within 6 months
4.5.2	Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue. The current timings for entry ban on trucks are as follows: 6AM to 12 noon and 4PM to 9PM. Trucks are allowed to enter between 12 noon and 4PM. The hours for non-entry of trucks may be increased and extended during daytime. Provide truck rest areas/parks along national and state highways to prevent entry of trucks into cities during peak hours. Pave all roads to control fugitive dust.	PWD, NHAI	
4.5.3	Introduce age and emission standards-based restrictions on the operations of commercial vehicles within the city.	NHAI, District and local administration	Within 6 months
4.5.4	Check overloading: Use weigh-in-motion bridges / machines (WIM) and weighbridges at entry points to the city to check the payload of commercial vehicles. As per the CMVR, a penalty of 10 times the applicable rate for overloaded vehicles is applicable. Two Weigh-in-Motion bridges have been made operational for the city of Kolkata and its suburbs including Howrah City outskirts	District and local administration, Transport department, Traffic Police	Within 6 months
4.5.5	Create management systems for loading and unloading of goods in city areas.	District and local administration, Transport department	6 months
4.5.6	Ensure fitness and road worthiness of trucks and compliance with PUC standards IS enforced. Central Motor Vehicles Rules have specified Safe Axle Weight and Gross Vehicle Weight for different make and model of Goods Vehicles. Carriage of loads in excess of permissible ceiling comes under an enforceable offence.	Transport Department	6 months
Medium to long term action			
4.5.7	Promote high capacity trucks for long-distance freight transport of mining material instead of smaller trucks or as applicable.	NHAI, District and local administration	Within 6 months
4.5.8	Diversion of truck traffic: Check feasibility of diversion of non-destined trucks into the city. Alternate routes need to be identified and improved.	District and local administration, Transport department, Traffic Police	Within 6 months
4.5.9	Radio frequency identification tag (RFID) based toll or entry tax collection: install RFID based toll collection system and also link it with VAHAN database. This will enable lesser congestion on toll gates. By using this technology vehicle identification by vintage, emission norm compliance, etc. will also be easier. Kolkata Metropolitan Development Authority can adopt such measures to make toll collection cashless and regulate entry based on age. This also allows scope of introducing environment pollution charge at the entry point.	District and local administration, Transport department, Traffic Police	1 year

Sr. no.	Action points	Agency Responsible	Timeline
4.5.10	Develop urban freight consolidation centers in relation to location of warehouses relative to suburban areas.	District and local administration, Transport department	1 year
4.6	Prepare an action plan to check fuel adulteration and random monitoring of fuel quality. To ensure that periodic, routine and surprise fuel testing is done for all transport and non-transport fuels. For this an action plan needs to be prepared in consultation with oil companies and ministry of petroleum and natural gas.	ICE, MoPNG, Oil marketing companies	6 months
4.7	Install vapor recovery systems in refueling outlets to reduce benzene and VOC emissions in cities. CPCB has issued directions for installation of Stage I and Stage II vapor recovery system in all retail outlets with capacity 3000 kiloliter and more in 46 million plus cities by December 2017. Retail outlets across the city should comply with this.	Transport department, State Oil Coordinator	6 months

5. URBAN MOBILITY

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
5.1	PUBLIC TRANSPORT SYSTEM			
Short-term action				
5.1.1	Improvement of existing public transport service infrastructure by installing adequate number of Bus Queue Shelters and Bus Post signs, etc. as per central guidelines.	WBTC, Howrah Municipal Corporation (HMC), Howrah Police	6 months	No separate budget done from routine activity
Medium-to long-term action				
5.1.2	Strengthen the bus service for Howrah-Kolkata city bus.	WBTC, Howrah Municipal Corporation (HMC)	18 months	To be finalized
5.1.3	Augment complete city bus fleet with Global Positioning System (GPS) and Passenger Information System (PIS). At present, city bus system operated by WBTC is equipped with IT based infrastructure. It is however very crucial to maintain the IT based systems in buses for improved services and operational efficiency.	WBTC, Howrah Municipal Corporation (HMC)		Not available
5.1.4	Facilitating multi-modal integration at major transit locations to ensure smoother transition between modes. There is need for infrastructure integration for seamless movement at other secondary transit locations. There is a need to identify a few other transit modes in the city and organize the existing informal services by infrastructure integration (i.e. provision of spaces/bays/exact location) for better movement.	Howrah Municipal Corporation (HMC), WBTC, Eastern Railway, Kolkata Metro Rail Corporation Ltd., RTO (PVD), Traffic Police	18 months	
5.1.5	To strengthen and prioritize movement of public transport over other modes, bus priority measures should be taken on major roads and intersections – as applicable.	Transport Department, WBTC, Traffic Police, Howrah Municipal Corporation (HMC)	Immediately	
5.2	INTERMEDIATE PARA TRANSIT (IPT)			

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
Short-term action				
5.2.1	IPT in the region operates on route permit and fixed fares. There are earmarked parking arrangements at interchange points/major junctions. Additionally, there should be terminal points and pick up/drop off nodes identified for IPT services in around existing major public transport services (bus/rail) such that it becomes an organized service and complements major modes. IPT services are lower in the pyramid of mobility options and hence larger in volume and thus is the requirement of several smaller nodes in operation.	KMDA, HMC, Traffic Police, RTO, Transport Department	6 months	
5.2.2	Facilitate IPT driver training, standard licensing procedures, and safety measures in operation.	RTO, Transport Department	6 months	
5.2.3	There should be training on importance of using unadulterated fuel and its effects and impacts on society as a part of registration and annual fitness checks.	RTO, Transport Department, Traffic Police, HMC	6 months	
5.2.4	E-rickshaw plying in the city should also follow standard process of registering, followed by driving training and safety in operation.	RTO, Traffic Police, KMDA and HMC	6 months	
5.2.5	Encourage cycling – Remove NMT movement restriction.	KMDA, HMC	1 year	
5.2.6	Introduce campaigns to create user awareness and adoption.	HMC, Traffic Police	6 months	
Medium term action				
5.2.7	Prepare a policy framework for future IPT development, with specific consideration on regulating numbers of IPT modes, restricting vehicles more than 15 years old from plying and laying down detailed steps for diesel to electric conversion.	KMDA	1-3 years	
5.3	ADOPTION OF ELECTRIC MOBILITY			
Short term action				
5.3.1	Prepare an incentive based scheme for quicker adoption of electric mobility in the city. At present, the State Tax Act promotes e-mobility by way of reduced taxation. Additionally, there should also be Incentive on de-registering ICE based IPT (auto) and adopting e-rickshaw to encourage clean fuel adoption.	HMC / RegionalTransport Authority	6-12 months	
5.3.2	Promote e-Rickshaws and electric auto-rickshaws as feeder services to the bus services to facilitate first and last mile connectivity by provision of parking/terminal points, etc. Faster registration process at RTO	Bus SPV / KMDA	6 months	

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
Medium to long term				
5.3.3	Prepare regulatory mechanism for provision of dedicated parking space for electric rickshaws/vehicles. Currently there are parking arrangements at interchange points/major junctions. But prioritizing space / parking arrangement for e-mobility will encourage its use.	HMC, Transport department, RTO (PVD)	1 year	
5.3.4	Take initiative to develop electric ecosystem such as charging infrastructure, better tariff regime, etc.	HMC / Electricity Department	1 year	
5.4	ROAD DESIGN			
5.4.1	Non-motorized transport and safe access	KMDA, HMC, Traffic police	1 year subject to completion of work of metro railways	
5.4.2	Prepare and implement plans for developing an NMT network. This should include following action: - Pedestrian infrastructure shall be designed based on the Indian Road Congress (IRC): 103-2012 - Target specific lengths of footpaths to be completed in a phased manner and cover the entire city. - Upgrade pedestrian crossing at least every 250 m, with pedestrian signals and signages. These should preferably be at grade. - Identify network to develop cycle tracks - Make safety audit of walking infrastructure mandatory. - Provide roadside public docking space for bicycles. - Make encroachment of NMT lanes punishable offence under the current provision of law. - Dedicated municipal budget shall be made for making streets safe. Reference: Indian Road Congress (IRC): 103-2012	KMDA, HMC, PWD	1-3 years year subject to completion of work of metro railways	
5.5	MULTI-UTILITY ZONES (MUZ)			
5.5.1	All the stationary elements on the street shall be organized for obstruction free streets. This should include the following elements – as applicable. - It shall have dedicated space provision for bus stops, tree plantation, street furniture, auto rickshaw stands, parking, hawkers, public toilets, information kiosks, underground and overhead utility services like electricity, water, telephone, gas, etc. - Space provision for all the street elements shall have to be done by activity mapping, surveys and stakeholder consultations. - A minimum width of 1.8 m shall be maintained for MUZ. Reference: Urban Street Design Guidelines Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre prepared by Delhi Development Authority.	KMDA, HMC, PWD	1–3 years	

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
5.6	<p>MAINTENANCE AND MANAGEMENT OF PARKING PLACES RULES</p> <p>Implement Parking Area Management Plan (PAMP) as a demand management tool. PAMP will demarcate legal parking area (on-street and off-street), cap parking and also prevent illegal parking. PAMPs to be prepared in consultation with local stakeholders, planning bodies/ departments.</p>			
Short-term action				
5.6.1	Demarcate the emergency vehicle route on all public roads within the neighborhood. Demarcate on ground wherever legal on-street parking is being provided for based on the local area plan.	KMDA, HMC, Traffic Police	6 months	
5.6.2	Ensure no parks and green areas are converted to parking.	KMDA, HMC, Traffic Police	6 months	
5.6.3	Where shared Multilevel Parking facility is provided demarcate ingress-egress plan and ensure that no major disruption occurs on main thoroughfare traffic. Also indicate pedestrian circulation plan.	KMDA, HMC, Traffic Police	6 months	
5.6.4	Eliminate free parking and introduce effective variable parking charges based on duration of parking and 'user pay' principle as per the National Urban Transport Policy.	KMDA, HMC, Traffic Police	6 months	
5.6.5	Do not allow gross-cost basis annual or monthly lump sum payment for parking in commercial areas. Annual passes allow unlimited use and do not reduce demand.	KMDA, HMC, Traffic Police	6 months	
Medium- to long-term action				
5.6.6	Physically demarcate legal parking areas. Equip them with metering systems, proper signage, IT for information on parking availability to reduce cruising time and on-street management.	KMDA, HMC, Traffic Police	6 months	
5.6.7	Develop a methodology for parking pricing in residential areas and other major trip attracting areas (CBD, commercial, institutional, etc.) in order to discourage misuse of urban land and reduce inflated parking demand. Pricing should encourage usage of designated parking spaces. Rationalize usage of on-street parking. Rationalize short term vs long term parking.	KMDA, HMC, Traffic Police	1-3 years	
5.6.8	Penalty for illegal/wrong parking esp. parking within the emergency lanes and non-designated areas to be prohibitive.	KMDA, HMC, Traffic Police	1-3 years	
5.6.9	Bundle existing / planned public parking facilities and on-street and off-street parking (including multi-level) facilities for management by a single agency/operator. New stand-alone parking only sites are mostly not required since parking is permitted in all use zones.	KMDA, HMC, Traffic Police	1-3 years	
5.6.10	Multilevel parking structure shall be equipped with smart technology such as real-time information on vacant parking slots, smart meters, etc.	KMDA, HMC, Traffic Police	1-3 years	
5.6.11	Earmark a part of parking revenue for local area improvement that includes footpaths, public amenities and parking facilities within the PAMP area.	KMDA, HMC, Traffic Police	1-3 years	

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
5.6.12	Introduce residential parking permit for regular parkers for use of public parking space and these may be monitored – as applicable.	KMDA, HMC, Traffic Police	1-3 years	
5.6.13	In order to optimize utilization of land, ensure that in all new projects (e.g. commercial, institutional, housing, etc.), at least 50% of the available parking spaces are made available for shared parking facility.	KMDA, HMC, Traffic Police	1-3 years	
5.6.14	Ensure in the parking contractual agreement that the revenue sharing model is dynamic and flexible, allowing for flexibility in charging and varied usage and rates of the parking spaces; specify the investment that the contractor will have to make for upgradation of the PAMP area including metering, ITS application for commuter information, and signage.	KMDA, HMC, Traffic Police	1-3 years	
5.6.15	Plan and implement parking provision for buses, commercial vehicles, and IPT-NMT modes, and for the differently abled.	KMDA, HMC, Traffic Police	1-3 years	
5.7	TRAFFIC MANAGEMENT			
Short-term action				
5.7.1	Conduct a third party / independent audit of geometry of all city roads and intersections and provide specific design based solutions.	Traffic Police, Howrah Municipal Corporation (HMC), Transport Department	6 months	
5.7.2	Conduct periodical audit of all intersections, IT infrastructure and signals at all major intersections.	Traffic Police, Transport Department	6 months	
5.7.3	Enforce lane driving through heavy fining in major arterial roads.	Traffic Police, Transport Department	6 months	
Medium-to long-term action plan				
5.7.4	Prepare Traffic Impact Assessment (TIA) guidelines and permit new developments based on the formulated TIA guidelines.	Traffic Police/ KMDA	1 year	
5.7.5	Prepare traffic management plan for special days, i.e. during Durga Puja festival / during urban flood situation.	Traffic Police, KMDA, HMC	1 year	
5.7.6	Install IT infrastructure for traffic management at major locations.	Howrah Municipal Corporation, Traffic police	1-3 years	
5.7.7	Financial model to support existing IT infrastructure in traffic management should be adaptive, self-sustaining and innovative.	Howrah Municipal Corporation, Traffic police	1-3 years	
5.8	TRAFFIC IMPACT ASSESSMENT			
Medium-to long-term action plan				
5.8.1	Any new development that has to come in the area should procure adequate clearance from traffic police along with development authorities. Clearance by traffic police will be based on assessment of impact on traffic that will be induced by the upcoming development in the area.	Howrah Municipal Corporation (HMC), KMDA, Traffic Police	1-3 years	

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
5.8.2	Make necessary infrastructure augmentations based on traffic impact assessments and costs should trickle down to the developer/real estate, if required and possible.	Howrah Municipal Corporation (HMC), KMDA, Traffic Police	1-3 years	
5.9	FINANCING OF URBAN TRANSPORT			
Medium-to long-term action plan				
5.9.1	Create dedicated and ring-fenced urban transport fund for meeting Urban Transport needs by adopting innovative financial instruments to mobilize local resources including land value capture and polluter pay principle and resources from private participation.	Transport Department, KMDA, Howrah Municipal Corporation (HMC)	1-3 years	
5.9.2	Rationalization and reallocation of funds from road capacity augmentation projects towards public transit systems and complete streets.	Transport Department, KMDA, Howrah Municipal Corporation (HMC)	1-2 years	
5.9.3	Encourage involvement of the private sector in activities such as operation and maintenance of road infrastructure, parking facilities, vehicle testing and certification facilities, repair facilities, construction and management of terminal facilities among others. Regulatory monitoring will be required for quality control, quality assurance and performance guarantee. The private sector will be involved in providing public transport services, but under well-structured procurement contracts along with strong supervision of their service level and compliance strategy.	Transport Department, KMDA, Howrah Municipal Corporation (HMC)	1-3 years	
5.10	DATA ON URBAN COMMUTE			
Medium-to long-term action plan				
5.10.1	Regular update of urban mobility database and information is one of the crucial aspects of assessing travel demand in a city and its related tasks. A city should maintain and update few basic databases as: <ul style="list-style-type: none"> - No. of trips per day - PCTR - Modal Split - Average trip distance by modes - Average trip cost 	Transport Department, Howrah Municipal Corporation (HMC), KMDA	1-3 years	

6. GENERATOR SETS

Sr. no.	Action points	Agency responsible	Timeline
6.1	Ensure that only those DG sets that meet the standards in terms of emission or design of chimneys/exhaust and acoustic enclosures are allowed to operate. Verify and check whether design specifications are followed and only thereafter the genset is to be allowed to operate.	Howrah Municipal Corporation, Police	6 months
6.2	Curtail use of DG sets in social events by providing temporary electric connections. Also restrict use of DG sets during high pollution episodes.	WBPCB, and Howrah Municipal Corporation, Police	6 months
6.3	Alternate power systems should be promoted in cell towers, and use of DG sets discouraged.	Department of Energy, Distribution Companies, Department of Power and NES	1 year
6.4	Leverage rooftop solar programme to reduce dependence on DG sets.		
6.5	Ensure access to quality electricity supply.		

7. OPEN BURNING (INCLUDING SOLID WASTE AND AGRICULTURE RESIDUES)

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
7.1	Enforce a complete ban on garbage burning in the entire region. Evolve a monitoring mechanism for this. Take stringent action against open burning of biomass, leaves, tyres, etc. to control such activities.	Howrah Municipal Corporation, Kolkata Metropolitan Development Authority, Resident Welfare Associations, WBPCB	6 months
7.2	To assess and implement requisite infrastructure for ensuring proper collection of horticulture waste (biomass) and composting-cum-gardening approach; municipal zonal offices should be responsible for controlling burning of leaves and garbage on roads/parks. All horticulture agencies should have compost pits in parks. Implement strong public outreach programme to promote household and community based composting systems (composting pits, shredders, etc.). There are open grounds and houses with compounds with tree cover that cause extensive leaf litter. Open burning of leaves must stop.		6 months
7.3	Decentralized waste management for hotels, apartments, institutions as per Solid Waste Management Rules, 2016. Implement provisions of Solid Waste Management Rules, 2016 to implement penal provisions to spot fine on waste burning. Strictly ban open burning of hazardous industrial waste.	HMC, KMDA	6 months
7.4	Use of satellite based monitoring as well as mobile spot check squads for enforcement.	HowrahMunicipal Corporation, KMDA, RWAs	6 months
7.5	Proper management of landfill sites at Kalipahari to prevent spontaneous fire,. Further dumping of waste at open landfill sites should be restricted.	HowrahMunicipal Corporation, KMDA, RWAs	6 months
7.6	Adopt roadmap for zero landfill policy to promote decentralized waste segregation, reuse and recycling.	Police Department, WBPCB GIS cell, Howrah Municipal Corporation, KMDA, RWAs,	6 months
7.7	With good decentralized and segregated waste management system in place, waste-to-energy plants will not be needed in the city. In case any location requires such a plant—strong siting policy should be adopted to keep it away from habitation including neighbourhoods of low income groups. Strict implementation of emissions norms, use of state-of-the-art technology, and provision of real-time emissions data to SPCB.	State Police Department, WBPCB	6 months

8. COMMON BIOMEDICAL AND TREATMENT FACILITY

Sr. no.	Action points	Agency responsible	Timeline
8.1	Implement emission norms for incinerators and examine the feasibility of less polluting alternatives in compliance to Biomedical waste treatment rules.	WBPCB, Municipal Corporation, incinerator facility operators	6 months
8.2	Implement CEMS for incinerators and provide data on emissions on an open platform progressively.		6 months
8.3	Develop a siting policy for biomedical incinerators.	WBPCB, supported by Municipal Corporation	6 months

9. COOKING FUELS AND OPEN EATERIES

Sr. no.	Action points	Agency responsible	Timeline
Medium to long term action			
9.1	A targeted programme to be implemented for 100 per cent coverage of households by distribution of LPG/PNG in all non-compliant cities.	Department of Power & NES, District and local administration	1-2 years
9.2	In low-income neighborhoods, as well as roadside eateries/dhabas/restaurants, etc. promote and give access to LPG and electricity. Mandate and link commercial license to clean fuels.	Dept. of Power & NES, Natural gas, municipal corporation, urban local bodies	1-2 years

10. ROAD DUST

Sr. no.	Action points	Agency responsible	Timeline	Financial Outlay
Short-term action				
10.1	Sprinkling of recycled water (without compromising other uses); introduce water fountains at major traffic intersections, wherever feasible. Adopt dust control measures for dug up areas. At present six tankers are plying @ 20 km per day for 25 days in a month. Requisite number may be estimated based on the street network and cleaning schedule.	District and local administration, PWD, Road owning agencies	6 months	6 lakhs per month
10.2	Phase-in mechanical / vacuum-based street sweeping wherever feasible; introduce wet / mechanized vacuum sweeping of roads.		6 months	
10.3	Construction of 8 km pavements.	HMC	4 months	6.08 crore
Medium- to long-term actions				
10.3	Implement truck loading guidelines, use of appropriate enclosures for haul trucks, and gravel paving for all haul routes.	Department of Transport, Traffic Police	1-2 years	
10.4	Maintain pothole-free roads for free flow of traffic to reduce emissions and dust.	Howrah Municipal corporation, District and local administration	1-2 years	
10.5	Increase green cover in the region. Undertake greening of open areas, gardens, community places, schools and housing societies.	West Bengal State Council for Science and Technology, HMC, local bodies, RWAs	1-2 years	
10.6	Enforcement of air pollution control in concrete batching (use of water spray and wind breakers, bag filter at silos and enclosures, hoods, curtains, etc.) or use clean alternative technologies.	WBPCB	1-2 years	
10.7	Adopt street design guidelines for paving of roads and footpaths (hard and soft paving) with vegetative barriers. Mandate restoration according to the guidelines after the completion of all infrastructure projects.	Road Owning Agencies, Department of industries	1-2 years	

11. RENEWABLE ENERGY

Sr. no.	Action points	Agency responsible	Timeline
Medium- to long-term action			
11.1	West Bengal has a solar energy policy. As per the policy, it is mandatory for all housing societies having a total contract demand of 500 KW to install solar rooftop systems to meet at least 1.5 percent of their total electrical load. This should be further strengthened and implemented. This should be linked with transition from diesel genset to solar power, also the electric public transport can be linked with solar power plans to shift to zero emission target. Identify and target institutional/industrial and residential consumers for faster adoption. Identify open areas in the city where solar power generation is possible.	WBREDA, Department of Power & NES, District and local administration	1-2 years
11.2	WB RE policy requires commercial and industrial establishments with more than 1.5 MW of contract demand to install solar rooftop systems to meet at least 2 per cent of their total electrical load. This should be further strengthened and implemented. This should be linked with transition from diesel genset to solar power. Identify the mandated entities to encourage adoption through awareness camps and introduce relevant penalties in case of non-compliance.	WBREDA, Department of Power & NES, District and local administration	1-2 years
11.3	Introduce a stand-alone scheme for state run institutions - schools, colleges, hospitals, etc. that meet the criteria and facilitate their adoption through a state tender; the tenders must be based on the aggregated demand and must occur at defined intervals to ensure developer participation.	WBREDA, Department of Power & NES, District and local administration	1-2 years
11.4	Facilitate uptake of solar PV on existing residential households and commercial establishments (for example - where there is a lack of rooftop space or single grid-connection for multiple houses) by introducing encouraging regulatory measures such as virtual and group metering.	WBREDA, Department of Power & NES, District and local administration	1-2 years
11.5	Introduce an online portal, where prosumers can apply for solar rooftop, interact with installers, and track the installation process [to check delays at discom and SNA's end] - inspections, grid connection, and subsidy disbursal.	WBREDA, Department of Power & NES, District and local administration	1-2 years
11.6	Setup a Solar Command Centre (SCC) within the WBREDA that provides guidance, facilitates redressals and acts as a watchdog for solar rooftop adoption, especially tracking progress under schemes and mandates (including Renewable purchase obligation).	WBREDA, Department of Power & NES, District and local administration	1-2 years

12. EPISODIC EVENTS

Sr. no.	Action points	Agency responsible	Timeline
12.1	Measures to control forest fires/biomass/crop residue burning: Use satellite based monitoring and on-ground enforcement to control such burning episodes. An assessment needs to be carried out to identify the reasons and kind of technological and fiscal measures needed to curtail the fires. This is part of regional action.	WBPCB, Agriculture and allied Industries, District and local administration	Ongoing
12.2	Firecrackers: regulate and control their usage including restrictions on timing as per the Supreme Court and CPCB and PESO guidelines.	District and local administration, Police Department, WBPCB, RWAs, Supported by Chief Controller Petroleum and Explosive Safety Organization (PESO)	Ongoing

13. URBAN GREENS AND FORESTS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
13.1	<p>Avenue plantation along roads with more traffic. Urban planning to integrate urban greens (parks, district forests, etc.) and urban forests in the Master Plans of the cities and all infrastructure development and urban redevelopment projects. At least 15-20 percent of the new urban redevelopment projects should be set aside for urban green and tree cover.</p> <p>Urban planning to provide for green roofs and vertical greens linked to infrastructure development. Green walling with plantations around dust generators and also to be dust barriers to be integrated with the Urban forestry and forest policy. 250 trees have been planted in 20 parks.</p>	Forest Department , HMC, KMDA, PWD, NHAI,	1 year

14. IMPROVE TRAINING AND CAPACITY

Sr. no.	Action points	Agency responsible	Timeline
14.1	Training and skill development will be required of public officials and other public functionaries for planning and management and execution of the plan. This will also require extensive capacity building in all sectors and infrastructure planning.	WBPCB Department of Personnel and Training, District and local administration	Ongoing

15. NEED FOR PUBLIC AWARENESS AND COOPERATION

Sr. no.	Action points	Agency responsible	Timeline
15.1	Organizing deeper public engagement and forums for public consultation for public understanding of the nature of solutions needed to address the complex problem of sustainable industrial development and urban mobility.	WBPCB, District and local administration	Ongoing
15.2	Formation of a public grievance redressal portal for redressal of public complaints on air pollution along with a supervisory mechanism for its disposal in a time bound manner.		

16. ACTION PLAN FOR POWER PLANTS IN THE REGION

There is no Power Plant in the regions under Howrah Municipal Corporation

17. ACTIONS FOR MANAGEMENT OF CONSTRUCTION DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
17.1	Adopt and implement dust control measures for all types of construction - buildings and infrastructure. The preventive measures as mentioned in CPCB guidelines. Construction agencies to be made liable. Impose penalty for non-compliance.	Howrah Municipal Corporation, Howrah Police	6 months
17.2	Undertake control measures for fugitive emissions from material handling, conveying and screening operations through water sprinkling, curtains, barriers and dust suppression units. Introduce steeper penalties for non-compliance. Needs enforcement.	Howrah Municipal Corporation, Howrah Police	6 months
17.3	Enforce restrictions on construction activities within urban airshed zones during high pollution period.	Howrah Municipal Corporation / WBPCB	6 months
Medium- to long-term action			
17.4	Notify rules to segregate construction and demolition waste. Provide a network of decentralized C&D waste segregation and collection sites across the city.	Howrah Municipal Corporation	1-2 years
17.5	For material handling, construction and demolition, it should be obligatory on part of the developers to provide evidence of debris on-site recycling and/or disposal at designated sites.	Howrah Municipal Corporation	1-2 years
17.6	Set up facilities to recycle construction and demolition waste. Mandate certain percentage of the material for new construction to be recycled construction waste. Implement provision of Central regulations for construction and demolition waste management rules 2016. Set up facilities for recycling of C&D waste.	District and local administration, Howrah Municipal Corporation, WBPCB	1-2 years
17.7	Notify the requirement for a comprehensive waste management plan (WMP) from bulk waste generators mentioning the estimated amount of generation, provision of dust control measures, details of the transporting entities, information about the location of waste disposal, etc. The WMP should be combined with building permits and made compulsory before any construction/ demolition/remodeling activity.	Howrah Municipal Corporation	1-2 years

A draft graded response action plan has also been prepared which shall be finalized as and when the air quality forecasting is available and the emission sources are ranked on basis of SA study. In addition, the finalization of GRAP also requires reconciliation with IMD forecasted data on air quality. It is already noted that the observed air quality is grossly different from the IMD forecasts. This draft plan is attached only as a specimen, which may also need further refining based on SA study and current year's experiences on air quality management:

GRADED RESPONSE ACTION PLAN (GRAP) FOR REDUCING AIR POLLUTION IN NON-ATTAINMENT CITIES OF WEST BENGAL

The proposed graded measure approach for each pollution source according to the Air Quality Index (AQI) categories includes appropriate measures for each level of pollution (PM10 / PM2.5). While the comprehensive clean air action plan must be implemented round the year, the GRAP measures are meant to be temporary measures for duration of smog episodes and are implemented according to the severity of the air pollution levels. Once the levels come down and stabilize, measures are withdrawn. The objective of the GRAP is to prevent pollution from getting worse when adverse weather conditions trap and spike pollution. A GRAP has been prepared, which may be implemented as and when required and when severe conditions are forecasted.

The proposed GRAP includes set of measures to be implemented with greater vigour and stringency to prevent and avoid high level of air pollution in cities. This is linked to the national air quality index that categorizes daily air quality as good, satisfactory, moderate, poor, very poor, severe, and emergency. All actions suggested for each category are cumulative and add up to the level of emergency as air quality worsens. For implementation of GRAP, the scientific Task Force under WBPCB will advise the District Level monitoring committee on the daily pollution levels and forecasting based on real-time monitoring. Accordingly, the Committee may issue notices to the city authorities to implement the pre-defined action. Each implementing department will appoint a nodal officer to facilitate implementation. The action notified for moderate and poor categories that are largely about stringent enforcement in different sectors can become default action for continuous implementation throughout the year. Additional measures meant for very poor and severe may be notified when such situation develops especially during calm and inversion conditions.

Moderate to poor	
Poor - When PM2.5 levels are between 91-120 microgramme per cum or PM10 levels are between 251-350 microgramme per cum; Moderate - When PM2.5 is between 61-90 microgramme per cum or PM10 is between 101-250 microgramme per cum	
Action to be taken	Agency responsible
Stringently enforce/stop garbage burning in landfills and other places and impose heavy fines on person responsible	Municipal Corporations
Close/stringently enforce all pollution control regulations in brick kilns and industries	State Pollution Control Board
Stringently enforce pollution control in thermal power plants through Pollution Control Board monitoring	State Pollution Control Board
Do periodic mechanized sweeping on roads particularly in roads with heavy traffic and water sprinkling every two days	Municipal Corporations, Traffic Police, PWD
Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or heavy fine	Department of Transport, Traffic Police
Stringently enforce rules for dust control in construction activities and close non-compliant sites	District Administration, Police
Deploy traffic police for smooth traffic flow at identified vulnerable areas	Traffic Police
Divert non-destined truck traffic	Municipal Corporations, Traffic Police
Strictly enforce Supreme Court orders on firecrackers	SPCB, District Administration in consultation with Chief Controller of Explosives, Petroleum and Explosive Safety Organization (PESO); Police
Ensure fly ash ponds are watered every alternate day during summer months (March-May)	Plant in charge of Power Plants
Information dissemination, social media, mobile apps should be used to inform people about the pollution levels, contact details of control room, enable them to report polluting activities/sources to the concerned authorities, and actions that will be taken by government based on the level of pollution.	State Pollution Control Board, District Administration

Very Poor	
When PM2.5 levels are between 121-250 microgramme per cum or PM10 levels are between 351-430 microgramme per cum	
Action to be taken	Agency responsible
Control use of diesel generator sets by improving electricity supply	State Pollution Control Boards
Restrict parking and enhance parking fee by 3-4 times in commercial areas to reduce usage of personal vehicles	Municipal Corporations
Augment public transport services by increasing frequency and ensure adequate para transit services	Department of Transport, State Transport Corporation
Stop use of coal/firewood in hotels and open eateries	Municipal Corporations
Alert in newspapers/TV to advise people with respiratory problems and cardiac patients to avoid polluted areas and restrict outdoor movement	State Pollution Control Board

Severe	
When PM2.5 levels are above 250 microgramme per cum or PM10 levels are above 430 microgramme per cum	
Action to be taken	Agency responsible
Close brick kilns, hot-mix plants, stone crushers and other highly polluting units or as applicable locally	State Pollution Control Board, District Administration, Police
Shut down / minimize operation of polluting coal based power plant if the plant is not complying with emission standards.	State Pollution Control Boards
Intensify public transport services. Introduce differential rates to encourage off-peak travel	Transport Department, State Transport Corporations
Increase frequency of mechanized cleaning of road and sprinkling of water on roads. Identify road stretches with high dust generation.	All road owning agencies including Municipal Corporations, Public Works Department and National Highway Authority of India
Restrict movement of trucks inside the coal field mine areas	State pollution control board, Department of steel and mines

Severe + or Emergency	
When PM2.5 levels cross 300 microgramme per cum or PM10 levels cross 500 microgramme per cum (or 5 times above the standard) or persist for 48 hrs or more.	
Action to be taken	Agency responsible
Stop entry of diesel truck traffic into city (except essential commodities)	Traffic Police, Municipal Corporations
Stop construction activities	Pollution Control Board, Municipal Corporations
Introduce some form of vehicle restraint measures for private vehicles based on license plate numbers, or introduce low emissions zones in the city to stop entry of polluting vehicles (old and ageing and polluting diesel vehicles etc). For this purpose introduce sticker system as per MoRTH guidelines to indicate fuel and date of manufacture of vehicles	Transport Department, Traffic Police
State Pollution Control Board Task Force to take decision on any additional steps including shutting of schools	

Actions to be taken by public

While the National Air Quality Index and health advisory will inform people about the dangers of exposure, people are also expected to take precautionary measures to protect themselves. Suggested actions by public are listed below:

Level according to AQI	Action
Very poor, severe and emergency	Those suffering from heart diseases, asthma, and other respiratory disease may consider avoiding undue and prolonged exposure
	Schools to suspend all outdoor activities and sport events
	Report visible emissions from vehicles, industries, power plants, garbage burning, and other non compliances to the respective control rooms
	Do not use diesel and kerosene generators
	Maintain vehicles properly (PUC certificate, replace car air filter, maintain right tyre pressure)
	Minimize unnecessary travel, use public transport & avoid using private vehicles

INSTITUTIONAL MECHANISM FOR IMPLEMENTATION OF GRAP

In order to implement and monitor progress of the proposed actions, a district level monitoring committee is proposed, which will also provide for the institutional mechanism for implementation. The committee may co opt members if situation demands.

Air Quality Monitoring network design criteria

Population (Census 2011)	Minimum No. of manual station under NAMP	Minimum no of proposed CAAQMS	Total
1,00,000- < 5,00,000	1-Background 2-Residential/ Commercial	1-Residential	4
5,00,000- <10,00,000	1-Background 2-Residential/ Commercial	1-Residential 1-Traffic dominant area 1- Commercial	6
10,00,000- <50,00,000	1-Background 2-Residential/ Commercial	2-Residential 1-Traffic dominant area 1- Commercial 1-Industrial area	8
≥50,00,000	1-Background in upwind direction 1-Background in down wind direction 2-Residential/ Commercial	4-Residential 3-Traffic dominant area 3- Commercial 2-Industrial area	16

Annexure 1

Department of Environment
Government of West Bengal
5th Floor, PraniSampad Bhavan, Bidhan nagar -106

No. / 194 /EN/T-IV-8/01/2019

Date: 19 /06/2019

NOTIFICATION

Whereas, air pollution is a serious concern,

Whereas, the Ministry of Environment Forest and Climate Change, GoI has launched National Clean Air Programme on 10th January 2019 and requested for constitution of Steering Committee, Monitoring Committee, Implementation Committee through communication dated 24.04.2019

Whereas, Kolkata has been identified as the 'Non-attainment city' in West Bengal under NCAP

Whereas, a weekly monitoring committee has been constituted for review of air quality and monitoring during winter months in Kolkata through notification vide memo no 2799/EN/T-IV-8/001/2015 dated 22.12.2017

Whereas, Comprehensive Action Plan (CAP) has already been prepared as per Hon'ble NGT order for Kolkata

Whereas, a monitoring committee AQMC (Air Quality Monitoring Committee) has been constituted as per order of Hon'ble National Green Tribunal (PR) in connection to OA 681/2018 vide memo no EN/3678/(1-10)/3C-38/2018 date 05.12.2018

Now, therefore, Governor is pleased to constitute the following Steering committee, Monitoring Committee, Implementation Committee as follows:

1) **Steering Committee for Implementation of National Clean Air Programme in West Bengal**

- Chief Secretary **Chairman**
- Additional Chief Secretary /Principal Secretary, Transport Department
- Additional Chief Secretary /Principal Secretary, Department of Urban Department and Municipal Affairs
- Commissioner, Kolkata Police
- Commissioner, Howrah Police
- Member Secretary, West Bengal Pollution Control Board
- Additional Chief Secretary/Principal Secretary, Department of Environment **Convener**

The Committee shall provide overall guidance for NCAP as applicable in West Bengal and review it on quarterly basis.

2) **Monitoring Committee for Implementation of National Clean Air Programme in West Bengal**

The roles and responsibilities of AQMC, which has been constituted vide *notification 3678/EN/(1-10)/3C-38/2018 dated 05.12.2018 (copy attached as Annexure A)* is extended also to monitor the NCAP in West Bengal and also to function as:

“**Monitoring Committee for Implementation of National Clean Air Programme**” in West Bengal under the Chairmanship of Additional Chief Secretary/Principal, Department of Environment. The Committee shall monitor NCAP as applicable in West Bengal closely and meet on monthly basis.

3) **Implementation Committee for Implementation of National Clean Air Programme in West Bengal**

The roles and responsibilities of weekly monitoring committee, which has been constituted vide *notification 2799/EN/(1-10)/T-IV-8/001/2015 dated 22.12.2017 (Copy attached as Annexure B)*, is extended also for daily monitoring and implementation of the NCAP in Kolkata and also to function as:

“**Implementation Committee for National Clean Air Programme in Kolkata**” under the Chairmanship of Commissioner, Kolkata Municipal Corporation. The committee shall be responsible for day to day monitoring and implementation of NCAP as applicable in Kolkata and meet on regular basis.

All three committees may co-opt subject specialist(s) from reputed scientific/technical institution, concerned government department/organization/civil society or Non Governmental Organization, if situation demands.

Sd/-

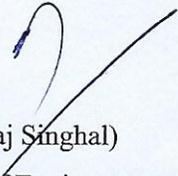
Chief Secretary
Government of West Bengal

Copy forwarded for kind information to:

No. ¹¹⁹⁴ / ¹⁻ (13) / EN/T-IV-8/01/2019

Date: 19/06/2019

1. Additional Chief Secretary, Industry, Commerce & Enterprises
2. Additional Chief Secretary, Micro, Small and Medium Enterprises & Textile Department
3. Principal Secretary, Department of Environment
4. Principal Secretary, Department of Urban Department and Municipal Affairs
5. Secretary, Agriculture Department
6. Commissioner, Kolkata Municipal Corporation
7. Secretary, Transport Department
8. Commissioner, Howrah Municipal Corporation
9. Commissioner, Kolkata Police
10. Commissioner, Howrah Police
11. Member Secretary, West Bengal Pollution Control Board
12. Shri Prabir Kr Barai, Senior Scientist, West Bengal Pollution Control Board
13. Sr. PS to Chief Secretary


(Niraj Singhal)
Chief Environment Officer
Environment Department

Department of Environment
Government of West Bengal
Notification

No. EN/3678(...)/3C-38/2018

Date: 05/12/2018

Whereas air quality of Kolkata has not attained National Ambient Air Quality Standards (NAAQS)

And whereas the Hon'ble Principal Bench in its order dated the 8th October, 2018 has directed the State Government to constitute an Air Quality Monitoring Committee (AQMC) for preparation of an appropriate action plan for attaining NAAQS

Now therefore, a ten member AQMC is constituted for preparation of Air Quality Action plan for Kolkata for attaining NAAQS with following members:

- Additional Chief Secretary, Environment *Chairperson*
- Secretary or his nominee, Transport
- Secretary or his nominee, Urban Development & Municipal Affairs (UD&MA)
- Secretary or his nominee, Industry, Commerce & Enterprise
- Secretary or his nominee, Micro Small and Medium Enterprises (MSME)
- Secretary or his nominee, Agriculture
- Commissioner or his nominee, Kolkata Police
- Commissioner or his nominee, Kolkata Municipal Corporation (KMC)
- Member Secretary, West Bengal Pollution Control Board (WBPCB)
- Chief Environment Officer, Environment *Convenor*

•
The nominee of any department should be a senior level officer at least in the rank of Joint Secretary/ Joint Commissioner/ Director

The Committee shall start functioning with immediate effect and shall submit the action plan to Central Pollution Control Board by 31.12.2018.

Sd/-
Chief Secretary
Government of West Bengal

**Department of Environment
Government of West Bengal**

No. 279/EN/T-IV-8/001/2015

Date 22/12/2017

NOTIFICATION

Whereas, the cities of Kolkata and Howrah are exposed to air pollution

Whereas, air quality of Kolkata and Howrah are of serious concern

Whereas, air pollution worsens every winter

Whereas, level of air pollution is already showing deteriorating impact

Whereas, the situation demands collaborative effort and intensified action

Now, therefore, the following committee is hereby constituted for weekly monitoring and follows up of status of air quality and initiation of action to control air pollution

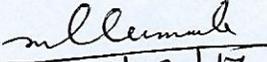
Committee for weekly monitoring of air quality situation, mitigation action and follow up

- Commissioner, Kolkata Municipal Corporation *Chairman*
- Commissioner, Howrah Municipal Corporation
- Representative of Transport Department
- Representative of Kolkata Police
- Representative of Howrah Police
- Prabir Kr Barai, Senior Scientist, West Bengal Pollution Control Board *Convenor*

The Committee shall review the status of area wise air quality on weekly basis. They shall monitor constructions sites, which are not properly following the guidelines for arresting emission from construction sector; the vehicles, which are not following emission norms; roadside dust suspensions; burning of coal or wood in restaurants, eateries and industries; and other actions recommended in the short term action plan. They shall initiate and take corrective action to improve air quality.

The Committee shall submit a weekly report to the Chief Secretary, Government of West Bengal.

The Committee shall hold the weekly meetings up to end of March 2018.


21/12/17
Chief Secretary
Government of West Bengal

Annexure 2

Government of West Bengal
Environment Department

Prani Sampad Bhavan, 5th floor, L.B-2, Sec-III, Salt Lake, Kolkata-700106

NOTIFICATION

No. EN/137/T-IV-8/01/2019

Kolkata.16.01.2020.

Whereas, the Ministry of Environment Forest and Climate Change, GoI has launched National Clean Air Programme (NCAP) on 10th January 2019 and requested for constitution of Steering Committee through communication dated 24.04.2019

Whereas, different municipalities in different districts are being identified as the 'Non-attainment city' in West Bengal under NCAP

Whereas, District Level Committees (DLC) are to be constituted as per order of Hon'ble National Green Tribunal (PR) in connection to OA 681/2018 for NACs

Whereas, Comprehensive Action Plan (CAP) has already been prepared as per Hon'ble NGT order for Kolkata and other 6 NACs, namely: Howrah, Haldia, Durgapur, Asansol, Ranigunge, Barrackpore

Now, therefore, In compliance with the aforesaid directions of the Hon'ble National Green Tribunal, Principal Bench New Delhi, the Governor is pleased to constitute DLCs for districts of West Bengal with NACs (except Kolkata) comprising of the following members-

1. Representative of the District Magistrate of respective districts of West Bengal - member
2. Representative of the Superintendent of Police of respective districts of West Bengal - member
3. Regional Officer of West Bengal Pollution Control Board of respective districts of West Bengal - member
4. Representative of the Chairman of the District Legal Service Authority (DLSA) - member.

The committee will function under the under the overall supervision and coordination of the District Magistrate of the respective districts of West Bengal.

By Order,

sd/-

Chief Secretary to the Government of West Bengal

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Environment Department
Government of West Bengal
2020