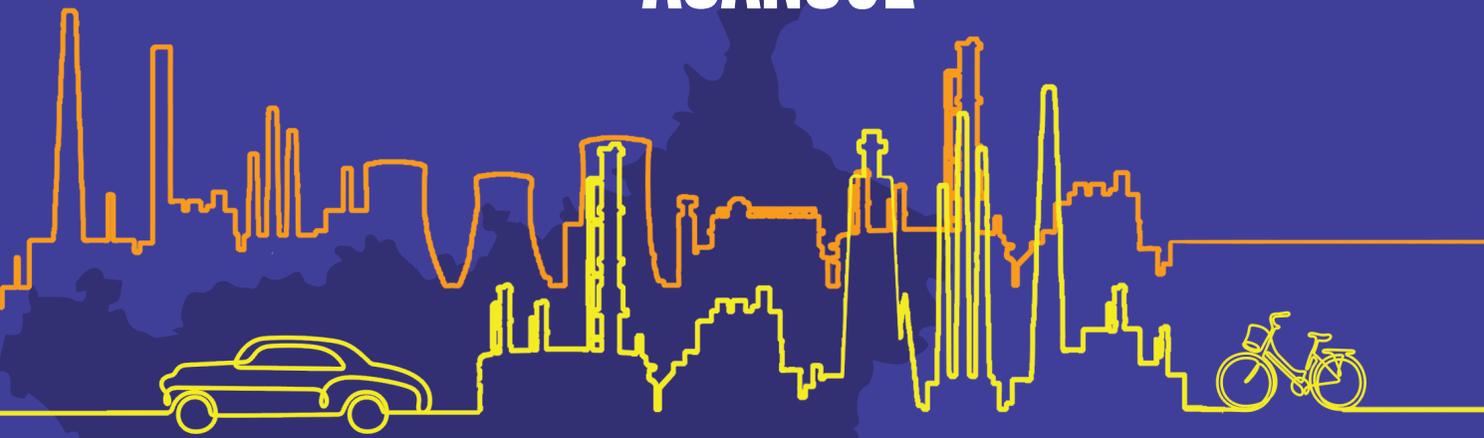




CLEAN AIR ACTION PLAN

ASANSOL



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 non attainment cities (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 on Asansol, one of the most industrialized towns in Eastern India that represents special pollution challenges.

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 needs addressing through the action planning process in the city. This multi-sector plan includes review of current challenges 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.

Part 2 lays out the proposed Clean Air Action Plan (CAP) 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 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.

Asansol is the second largest city of West Bengal. It is densely populated, and is located at the Paschim Badhaman district. Industrial emissions, road dust, vehicular emissions, emissions from the construction sector and trans-boundary pollution continue to foul the city air. The situation aggravates in winter months when typical weather conditions like temperature inversions entrap pollutants in lower levels of atmosphere.

PART I
OVERVIEW

1. Air quality concern and public health imperative

1.1. Air quality monitoring

Currently, there are two manual air quality monitoring stations and one real-time station in Asansol (see *Table 1: Locations of the ambient air quality monitoring stations and the parameters monitored in Asansol*). The real-time monitors record key pollutants including particulate matter less than 10 micron size (PM10), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and ozone (O₃). However, real-time monitoring of the more harmful particulate matter, less than 2.5 micron size (PM2.5), is limited at present.

Table 1: Locations of the ambient air quality monitoring stations and the parameters monitored in Asansol

Station name and location	Parameters monitored
Automatic monitoring stations	
Asansol Court Area, Asansol	PM10, PM2.5, SO ₂ , NO ₂ , O ₃ , NH ₃ ,
	CO, C ₆ H ₆
Manual monitoring stations	
Asansol Municipal Corporation	PM10, PM2.5, SO ₂ , NO ₂
Burnpur Town Department, Burnpur	PM10, PM2.5, SO ₂ , NO ₂

Source: As provided by the West Bengal Pollution Control Board and CPCB website for automatic monitoring station

Further strengthening of the air quality monitoring grid, especially based on real-time monitoring will provide more robust data and enable assessment of local area trends as well. Real-time monitoring and on-line reporting of data is critical for implementation of short-term measures to enable decision-making on a day-to-day basis (see *Box 1: National Air Quality Index (NAQI) and need for daily emergency response*). Two more continuous emission monitors and one manual monitoring station are scheduled for implementation.

Daily air quality index and the pollutant leading the index for the day, will determine the nature of daily action during high pollution days as predefined in the short-term or graded response action plan. Thus, this needs to be supported by real-time automatic quality monitoring and continuous reporting of daily air quality to assess the rolling daily average. Manual monitors generally report data twice a week.

Data reporting: 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. CPCB provides real-time data from the Asansol Court Area. PM2.5 is only monitored at The Court Area and data is available since 2018.

1.2. Status of air quality

Asansol, second most populated city in West Bengal, lies in the Paschim Bardhaman district. Industrial emissions, road dust, vehicular emissions, emissions from the construction sector and trans-boundary pollution continue to foul the city air.

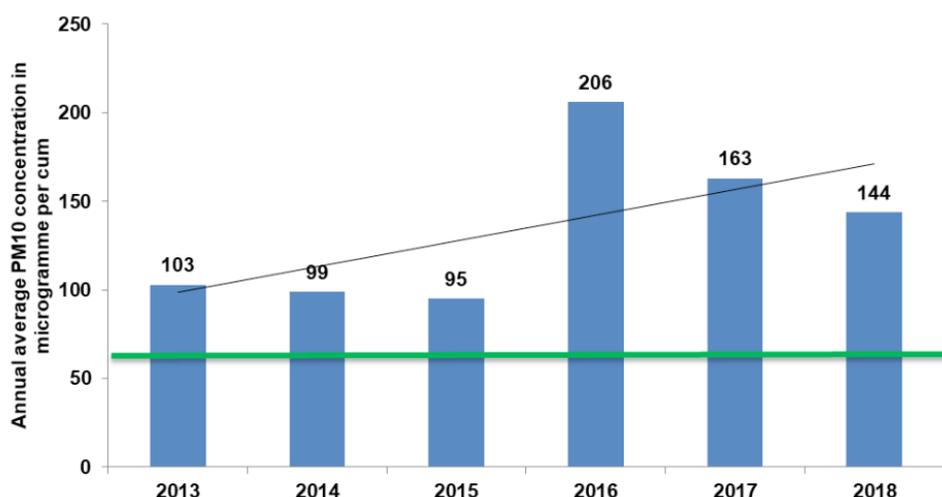
Long-term trend analysis helps to understand impact of action on long-term ambient concentration as well as helps to assess the current baseline of the pollution concentration and required reduction target to meet the national ambient air quality standards. In the long-term, emissions must be permanently reduced so that peak episodes are not repeated. 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 (NAAQS) and to address the non-attainment status.

Long-term annual average trend in PM10 in Asansol

To understand the long-term trends in annual average levels, available PM10 data provided by WBPCB has been analyzed for Asansol. As mentioned earlier, long-term annual average PM2.5 data is scarcely available. The data shows an increasing trend since 2013, peaking in 2016. Though the numbers are lower for 2018, the concentration is still very high compared to the standard (see *Graph 1: Asansol—long-term trend in annual average level of PM10 concentration*).

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

Data from West Bengal Pollution Control Board (2013–18)



Source: Based on the data provided by WBPCB the monitoring station at Asansol Court

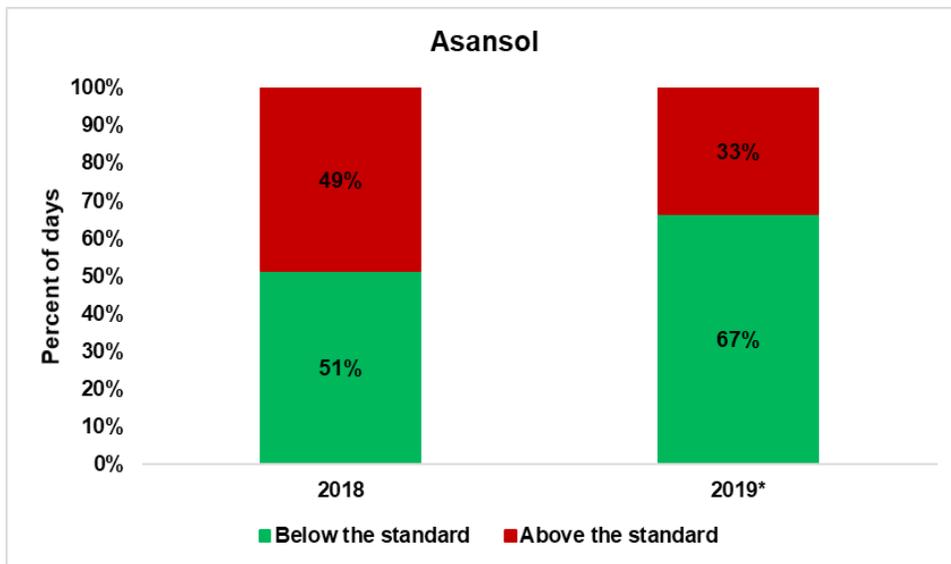
As per methods used by the US Environmental Protection Agency (USEPA), an annual average of immediate past three years is taken to define the base pollution level and, accordingly, a target reduction limit is set. This helps to assess the level of reduction that is needed to meet the clean air standards. Setting such targets helps to determine the level of reduction that is needed and plan detailed measures for all sources of pollution.

As per the data, Asansol requires to reduce their PM10 concentration by approximately 65 per cent. This was calculated using the average PM10 concentration for three consecutive years (2016–18).

Daily air quality trend analysis to assess implementation of the short-term action plan

- Once the short-term actions comes into force, it will become obligatory to carry out daily analysis of 24-hour average concentration of air pollutants to classify days based on the NAQI and implement measures according to the severity of pollution.
- It may therefore be helpful to analyze past trends to assess how days so far have been distributed across different NAQI categories of good, satisfactory, moderate, poor, very poor, and severe.
- It has not been possible to carry a long-term analysis of smaller particles of 2.5 micron size (PM2.5) as its monitoring is more recent and only limited data is available. However, from a health standpoint, this pollutant is more harmful as being very tiny, these particles go deeper into the lungs and cause significant harm, even during short exposure. Pollution profile of the days is expected to change substantially if PM2.5 levels are taken into consideration (see *Graph 2: Number of days when the PM2.5 exceeded the standards—2018 and 2019* and *Graph 3: Categorization of daily PM2.5 based on AQI categories.*)

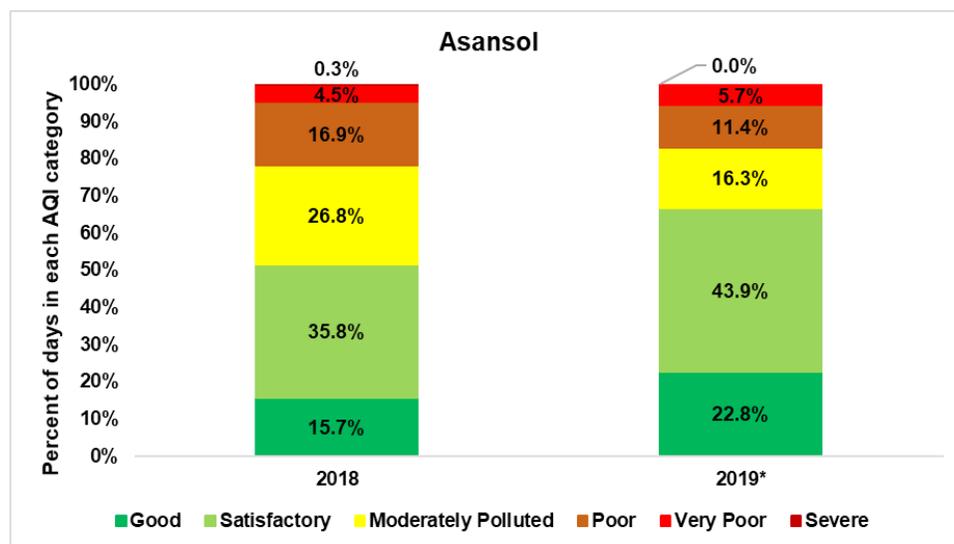
Graph 2: Number of days when the PM2.5 exceeded the standards—2018 and 2019 (03 September)



Note: Data for 2019 is available till 03 September

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

Graph 3: Categorization of daily PM2.5 based on AQI categories (2018 and 2019—September)

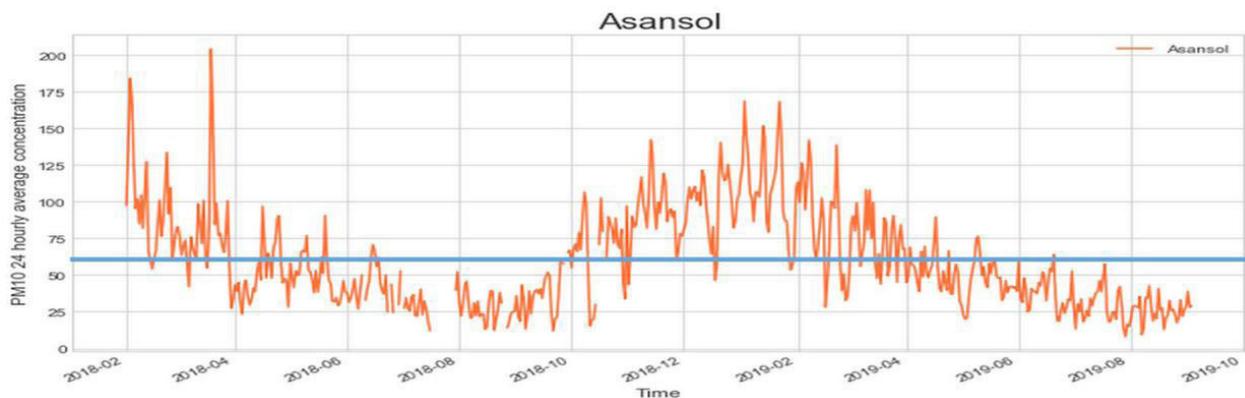


Note: Data for 2019 is available till 03 September

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

PM2.5 based classification shows that in Asansol, the number of days in very poor category is high in 2019 compared to 2018 even though the year is not over. 5.7 per cent of the days in 2019 fell in the very poor category.

Graph 4: Daily PM2.5 trend 2018–2019 (03 September)



Source: Based on CPCB air quality data.

Seasonal trends in air quality and mapping of smog days

The problem of poor air quality aggravates in winter months when typical weather conditions like temperature inversions entrap pollutants in lower levels of atmosphere, which is at the breathing height. Graph 4 shows peak levels of PM2.5 in the months of October to March, followed by a decrease in summer months. Graph 5 demonstrates that PM10 levels reach ‘very poor’ to ‘severe’ conditions during winter, resulting a greater number of smog days. Whereas, in summer months, most days fall in the “moderate” category as seen in Graph 6. Crop residue burning in the

Box 1: National Air Quality Index (NAQI) and need for 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

(Range)	24-hr	24-hr	24-hr	8-hr	(mg/m ³)	24-hr	24-hr	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.

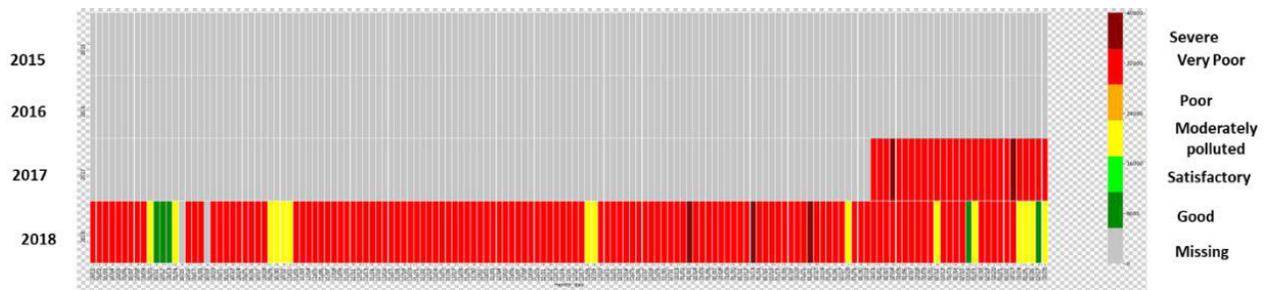
Source: Ministry of Environment and Forest and Climate Change

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

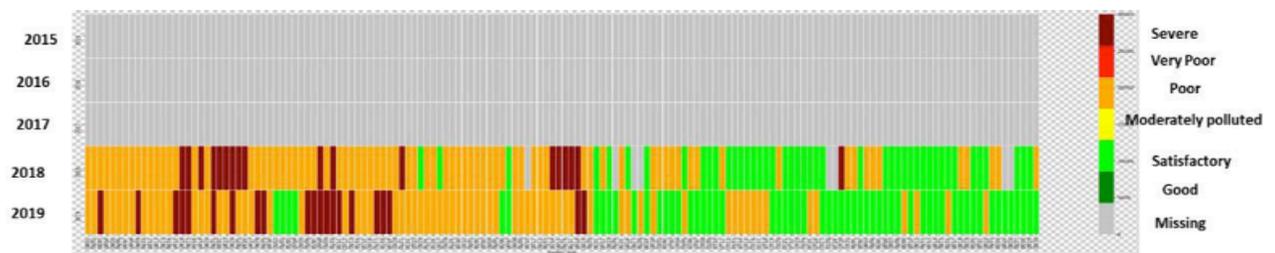
Source: Ministry of Environment and Forest and Climate Change

Graph 5: Categorization of PM10 based on AQI categories during winter in Asansol (01 October–28 February) 2017–2018



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

Graph 6: Categorization of PM10 based on AQI categories in Asansol (01 March–04 September) 2018–2019



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

months of October also contributes significantly to pollution levels and has been discussed later in this report.

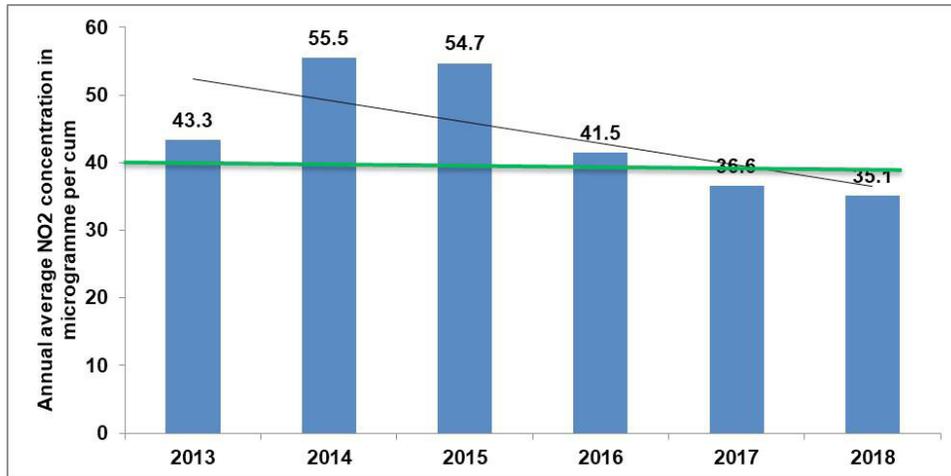
Long-term annual average trend in NO₂ in Asansol

Data reported by WBPCB shows that the annual average nitrogen dioxide levels have remained high but have declined over the years and are currently meeting the standards (see *Graph 7: Long-term trend in annual average NO₂ concentration in Asansol*). 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 another very harmful gas. For Asansol, industries are the major source of nitrogen and can be monitored through appropriate measures. Though the nitrogen levels are decreasing, the level continues to be high.

1.3. Public health evidence

Air pollution is a serious contributory risk factor for respiratory diseases, metabolic diseases, and cancer, which is the end point of toxic risk. Widely investigated links between air pollution and a range of disease profiles have demonstrated an insidious link between air pollution and COPD, ischaemic heart diseases, hypertension, diabetes, effect on brain and a range of cancers. Hence, longer-term systemic strategies need to be put in place to reduce pollution levels over time. 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.

Graph 7: Long-term trend in annual average NO₂ concentration in Asansol



Source: Based on the data provided by WBPCB the monitoring station at Asansol Court Data from West Bengal Pollution Control Board (2013–18)

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, those 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. Air pollution is a serious short-term trigger factor for causing early deaths due to heart disease.

The series of studies carried out by Chittaranjan National Cancer Research Institute (CNCR) in Kolkata have demonstrated very valuable evidence on the very harmful longer-term health effects of air pollution. Additionally, 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. Hence, long-term clean air planning strategies are needed to avert public health emergencies stemming from exposure to high pollution levels.

2. Pollution source profile and baseline policy action

Any air pollution control strategy will need baseline information on the sources and their relative contribution to ambient air pollution concentration as well as population exposure. There is currently no official study on source apportionment and source inventory to bring greater precision in the assessment of the pollution profile of the city. 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 available from the regional offices of the pollution control board and from the field inspection. It is also possible to piece together the fragmented estimates that exist on pollution sources from different studies conducted over time.

In order to draft the current plan, the available information on the assessment of pollution sources has been taken into consideration. The latest emission inventory for Asansol–Durgapur is available from an independent think tank called Urban Emissions, as of 2018. This study shows that the contribution of the industrial sector to PM_{2.5} is highest at 66 per cent, which is followed by dust at 11 per cent, brick kilns at 8 per cent, transport sector (6 per cent) and residential (4 per cent). The industries are the dominant source as shown by this study for four major pollutants (*see Graph 8: Emission inventory for Asansol–Durgapur based on PM_{2.5}, PM₁₀, NO_x and SO₂*).

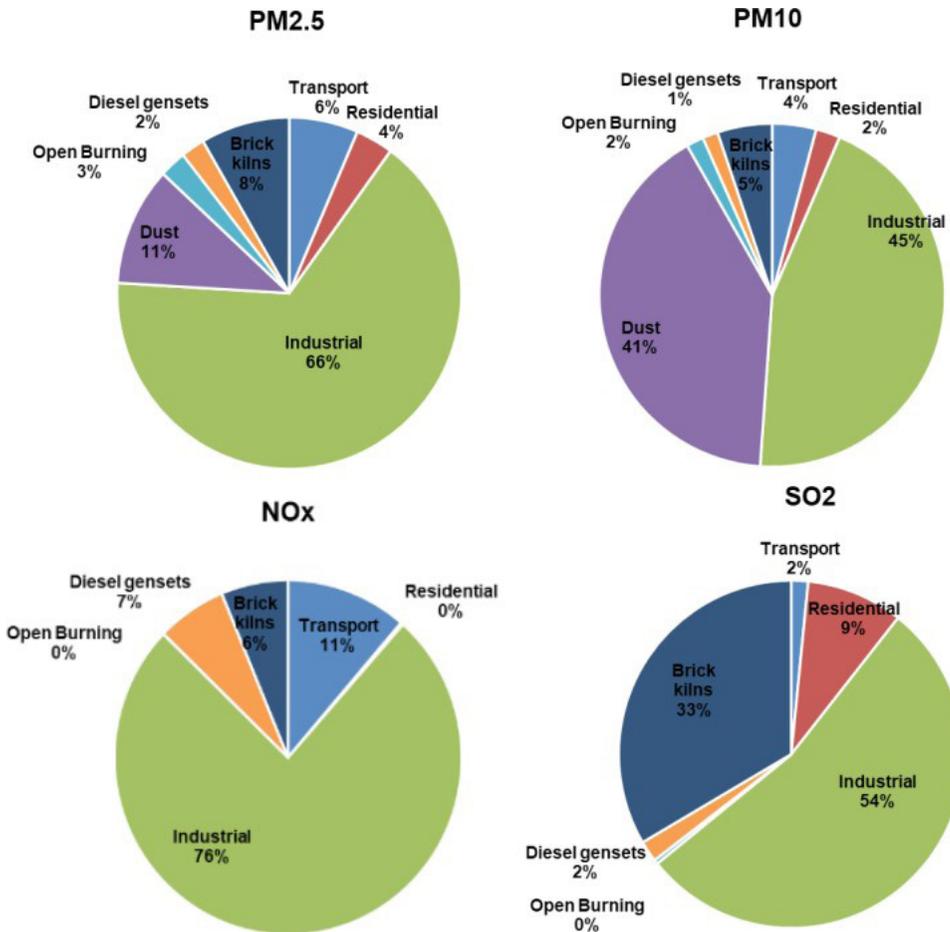
For the purpose of this report, field visits were organized to identify the key pollution sources in the city. Additionally, feedback was received from concerned regional offices of SPCB. This enabled mapping of the key big sources of air pollution. Even though the exact quantification is not possible 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 the desired reduction targets, both of which require deep cuts in emissions from all sources.

2.1. Industry and power plants

The economy of Asansol is principally dependent on coal mines, cement manufacturing units, iron, steel and allied industries, all of which are dependent on coal. The city has access to large reserves of coal due to its close proximity to the Raniganj Coal Fields and the coal mines of Sitarampur. Geographically, Asansol is a part of the Chhota Nagpur Plateau and it lies on the banks of the Damodar River. The Damodar Valley itself is a major coal mining area. Newer industries such as heavy engineering industries, fertilizers manufacturing, chemical plants and coal-based chemical factories have emerged since the last four decades.

A large number of industries are registered with the West Bengal Pollution Control Board. WBPCB maintains a record of all regulatory orders, including closure 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 or furnaces are required to be equipped with air pollution control

Graph 8: Asansol–Durgapur: Emission inventory based on PM2.5, PM10, NOx and SO₂



Source: Based on UrbanEmissions.info 2018

systems such as electrostatic precipitators (ESPs), cyclones, bag filters and scrubbers. However, there are concerns around enforcement and proper operation and maintenance of pollution control systems. This will require more rigorous on-site continuous emissions monitoring system (CEMS) for compliance. Further, quality control and adherence to standards during CEMS installation needs to be enforced.

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, the dirty bottom of the barrel fuels like petroleum coke and fuel oil, etc. are widely used. In smaller units unregulated fuels like tyre oil, etc. are used. The WBPCB is considering a switch to cleaner fuels like oil or gas to reduce particulate emission load from industrial operations. Some of the industries in the city have already begun using coalbed methane but continuous supply remains a challenge. Clean fuel strategy along with stringent emissions control systems will require an incentive policy to make a supply plan and infrastructure for cleaner fuels. Adoption of a favourable taxation and pricing policy to make cleaner fuels competitive vis-a-vis the

dirty fuels will aid a gradual shift to clean fuels for industries (such as natural gas, electricity, and low-sulphur fuels).

Industrial pollution control plans and schemes in the state, especially around the targeted non-attainment industrial cities, have been framed around the requirements of the designated Critically Polluted Areas. Asansol is such a designated Critically Polluted Area. The MoEF&CC through its Office Memorandum dated 13 January 2010 has directed respective SPCBs to prepare Action Plans for each of the Critically Polluted Areas for abatement of pollution. West Bengal Pollution Control Board has prepared separate Action Plan for the Asansol area. Based on 'Implementation of Action Plan for critically polluted area (Asansol)' (prepared as of March 2015) several action points have been identified and initiated for air pollution control. This plan has been prepared for Asansol and the adjoining areas. Though not an exhaustive list, several action points may be extracted from this plan and an evaluation can be carried out on the current status of implementation. Since Asansol is a Critically Polluted Area due to industrial pollution, this remains a reason for its non-attainment status as per NAAQS.

Individual industrial units will require mapping of the status and operation of the pollution control equipment to decide on the severity of action. Such efforts are underway. The Kalyanpuri Industrial Estate is within the city limits and houses several cement industries. In addition, Burnpur area is home to steel plants and sponge iron units. Experts opine the need for a buffer zone with green cover as industries and residential colonies are often co-located. This is also in line with the Industrial Siting/ Locational Policy in West Bengal that clearly states that setting up of any red category industries is not permitted within the municipal areas of Kolkata and Bardhaman district except at the Jamuria industrial estate. The actions recommended in 'Action Plan for Polluted Industrial Areas (PIAs) in West Bengal', prepared by Committee for Restoration of Environment Qualities of PIAs in West Bengal, are attached as an Annexure.

Fugitive emissions present a unique challenge in the context of industrial pollution. While stack emissions are monitored and can be controlled accordingly, fugitive emissions from processes such as material handling and storage, transport, and conveyor belts often go unnoticed. The following sections provide insights into major industries of Asansol that fall in the red category (those with a pollution index score of 60 and above as designated by MoEF&CC).

Table 4: Red category industrial units impacting air quality in Asansol Subdivision

Industry category and type	Total number of units	Percent of total units
Coke making, liquefaction, coal tar distillation or fuel gas making	113	32
Mining and ore beneficiation	49	14
Iron & steel (involving processing from ore / integrated steel plants) and/or sponge iron units	41	12
Cement	35	10
Ferrous and non-ferrous metal extraction >1 MT/hr involving different furnaces through melting, refining, reprocessing, casting and alloy making, and including metal extraction from lead	16	5
Basic chemicals and electro chemicals and its derivatives including manufacturing of acid	14	4
Manufacturing of glass (bulb, lamp, optical lens, etc.) using coal / wood fired kiln including manufacturing of lead glass	13	4
Ceramic, refractories having coal consumption >=12 MT/day	12	3
Industry or process involving foundry operations (foundries having capacity <5 MT/hr requiring coal/coke consumption <500 kg/hr)	11	3
Coke briquetting (sun drying)	7	2
Steel and steel products using various furnaces like blast furnaces / open hearth furnace / induction furnace / arc furnace / submerged arc furnace / basic oxygen furnace	6	2
Manufacturing of explosives, detonators, fuses including management and handling activities [including manufacturing of safety match]	5	1
Industrial inorganic gases namely: (a) Chemical gases: acetylene, hydrogen, chlorine, fluorine, ammonia, sulphur dioxide, ethylene, hydrogen sulphide, phosphine [filling/refilling of CO ₂ gas] and (b) hydrocarbon gases: methane, ethane, propane	4	1
Copper smelter	3	1
Stone crushers	3	1
Aluminium smelter	2	1
Manufacturing of lubricating oils, grease and petroleum based products	2	1
Railway locomotive work shop / Integrated road transport workshop / service centers having wastewater generation >=100 KLD	2	1
Saw mills	2	1
Thermal power plants	2	1
Wire drawing and wire netting [including bailing straps, wire drawing by cold process only]	2	1
Any industry / industrial activity (irrespective of category), having solid fuel fired boiler / Thermic Fluid Heater (TFH) irrespective of capacity or oil / gas fired boiler >5 TPH	1	0
Forging of ferrous and non-ferrous metal (using oil or gas fired furnaces)	1	0
Industrial carbon including electrodes and graphite blocks, activated carbon, carbon black	1	0
Power generation plant (including waste to energy plants >15 MW capacity which attract provisions of EIA Notification, 2006 as amended) [except wind and solar renewable power plants of all capacities and mini hydel power plant of capacity < 25 MW] (Other than Thermal Power Plants)	1	0
Rolling mill (gas fired) and cold rolling mill	1	0

Source: Data provided by the West Bengal Pollution Control Board and Regional Agencies

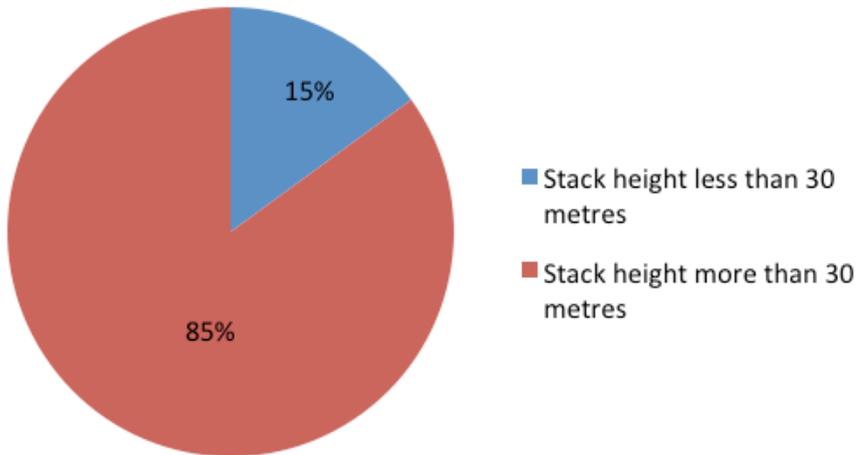
Map 1: Location of thermal power plants in West Bengal



Data was collected from 62 industrial units, including thermal power plants, sponge iron units and foundries. Area under study included the Kanyapur Industrial Estate managed by Asansol Durgapur Development Authority (ADDA) along with Burnpur and Kulti. Average sampling time for PM was 32 minutes. Total PM emission load for the area was calculated to be 2.7163 tonnes per day (within an area of 127.24 sq. km)

The non-compliant units bypass the CPCB standards, despite having APC devices. It is suggested to check for quality of these measures and alter processes with best practices associated with the industry type. Additionally, pollution control measures must be scaled up with more efficient APC devices such as ESPs and cyclones. Currently, they are using bag filters, which are clearly not enough.

Stack height: CPCB recommends that all industrial units (except thermal power plants) must have a minimum stack height of 30 metres from ground. In case of power plants, if production is 200/210 MW or less than 500 MW, minimum stack height is 220 metres. For capacity above 500 MW, stack height should be above 275 metres. Stack height may also be determined by rate of SO₂ emissions using the equation:

Graph 9: Details on stack height

Source: Based on data provided by the WBPCB

$$H = 14 * (Q)^{0.3}$$

Where:

H = Stack height in metres

Q = Emission rate of SO₂ in kg/hr

For Asansol, nine units had stack height below 30 metres out of the total 62 units for which data was available.

Fugitive emissions: Complete data on fugitive emissions was not available. There are records for TSPM ($\mu\text{g}/\text{m}^3$) and RSPM ($\mu\text{g}/\text{m}^3$) only for some industrial units. SO_x and NO_x concentrations were not recorded. It is suggested to monitor SO_x and NO_x for all units. A generic advisory for management of fugitive emissions within industries has been provided in the Action Plan. This is particularly useful for Asansol as the guidance includes remedial measures for the cement industries, which are prevalent here.

Technology roadmap for the industries in Asansol: A literature review was carried to gain insights into the best air pollution control technologies that are currently being used in India and abroad (see *Table 5: Best available technology for abating pollution levels in industries*).

Table 5: Best available technology for abating pollution levels in industries

Sr. no.	Industry type	Existing technology/ process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long term)
1	Iron and steel (involving processing from ore / integrated steel plants) and or sponge iron units	Installation of coke dry quenching (CDQ); installation of top gas recovery turbine (TRT); introduction of coal dust injection (CDI); waste heat recovery in sinter plant; waste heat recovery at blast furnace stove and use of byproduct fuel for power generation; installation of dolomite plant-dust extraction system (FD cooler and bag filter); use of twin hearth furnace; use of water tower ESP (wet) and ESP (dry)	Direct Reduction Electric Arc Furnace and Pulverized coal injection method	Direct Reduction Iron-making (DRI)
2	Ferrous and non-ferrous metal extraction >1 MT/hr involving different furnaces through melting, refining, reprocessing, casting and alloy making and including metal extraction	Nothing specific, each industry may have specific processes. Most coal fired boilers have been converted to oil/gas fired driers, preferably with coalbed methane (CBM)	More data/information needed on type of metal being extracted	Generic Process include: Boliden Norzink process for mercury removal, selenium filter, activated carbon, Jeritt Process for removal of other HAPs
3	Coke making, liquefaction, coal tar distillation or fuel gas making	Most coal fired boilers have been converted to oil/gas fired driers, preferably with coalbed methane	Switch to Coke Dry Quenching System (CDQ), already used by Tata Steel	The Kress Indirect Dry Cooling (KIDC), inert gas blanketing
4	Cement	Bag filter with ball mill and cyclone separator with coal-fired slag drier	Rotary dry-process kilns, use of alternative fuel such as biomass, refuse derived fuel (RDF), use of additive materials such as fly ash / blast furnace as clinkers	Use of alternative fuel such as rice husk, utilization of red mud as alternative fuel, etc. Consider development of limestone based cement and low carbon cement as a possible long term strategy
5	Ceramic, refractories having coal consumption >=12 MT / day	Wet scrubber with coal fired DD Kilns furnace. Refractory manufacturing units have switched over to new generation producer gas-fired shuttle kiln, tunnel kiln or push-bat kiln which are much more fuel-efficient kilns for environment friendly operations	Shift to natural gas or CBM, maintain power factor at 0.99, Replacement of Existing Standard Efficiency Motors by Energy Efficient Motors, Install automatic air-fuel ratio system in kiln	Use of spray drying, reduce channelled emissions from hot off-gases by applying electrostatic precipitators or wet dust separators, applying flue-gas cleaning with a fabric filter and spray glazing
6	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]	Similar to iron and steel (involving processing from ore / integrated steel plants) and or sponge iron units		

Sr. no.	Industry type	Existing technology/ process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long term)
7	Industrial carbon including electrodes and graphite blocks, activated carbon, carbon black	More data/information needed	Shift from inefficient induction furnaces to electric arc furnaces.	More data/information needed
8	Aluminium smelter	More data/information needed	Control of fluorides by using dry scrubbing system for the smelter gases, controlling pollution and also recycling the fluorides thus affecting economy in the consumption of cryolite and aluminium fluoride.	Use of inert electrodes; use of wetted cathodes; multipolar cells; carbothermic reduction; kaolinite reduction; low-temperature reduction; use of ionic liquids
9	Industry or process involving foundry operations (foundries having capacity >=5 MT/hr and requiring coal / coke consumption >=500 kg/hr)	Nothing specific, coal fired boilers have been converted to oil/gas fired drier, primarily using CBM	Use of Cupola furnace in place of Induction furnace; installation of automatic air flow controller/flue gas monitoring to check excess air: Replace conventional cupola with Divided blast cupola; install LEDs/ magnetic lamps in place of conventional lights	Use of enclosed conveyors, use of induction furnaces, use of Cupola furnaces, and direct oxygen induction
10	Power generation plant (including waste to energy plants >15 MW capacity which attract provisions of EIA Notification, 2006 as amended) [except Wind and Solar renewable power plants of all capacities and Mini Hydel power plant of capacity <25 MW] (Other than Thermal Power Plants)	More data/information needed	More data/information needed on each type of plant to suggest suitable interventions	More data/information needed on each type of plant to suggest suitable interventions
11	Industrial inorganic gases processing units namely: a) Chemical gases: acetylene, hydrogen, chlorine, fluorine, ammonia, sulphur dioxide, ethylene, hydrogen sulphide, phosphine [filling/refilling of CO ₂ gas] b) Hydrocarbon gases: methane, ethane, propane	More data/information needed	Use of bag filters, as recommended by CPCB	More data/information needed on each type of plant to suggest suitable interventions as each gas has multiple optimum processes

Sr. no.	Industry type	Existing technology/ process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long term)
12	Manufacturing of glass (bulb, lamp, optical lens etc.) using coal / wood fired kiln including manufacturing of lead glass	Installation of wet scrubber with producer gas plant. Coal fired boilers have been converted to oil/gas fired drier (preferably with CBM which is available within accessible distance).	Use of wet scrubbers and fabric filters. National Glass Works, Assansol has installed producer gas based regenerative furnace which is less polluting and enhances fuel efficiency; may be replicated across other units.	Low loss vacuum pumps, e.g. dry vacuum pumps; totally enclosed belt conveyors; enclosed forming chambers; use of granular raw materials preferred to fine powders; use of baghouses, venturi scrubbers, ESPs.
13	Copper Smelter	More data/information needed	Use of Fabric filters, ESPs, Scrubbers	Alkali semi-dry scrubber and fabric filter. Wet alkali or double alkali scrubbers using lime, magnesium hydroxide, sodium hydroxide. Combinations of sodium or alumina/aluminium sulphate in combination with lime to regenerate the reagent and form gypsum. Use of TBRC, Sealed Submerged Arc Electric furnace, Ausmelt/ISA Smelt, KRS and the Peirce-Smith converter
14.	Any industry / industrial activity (irrespective of category) having solid fuel fired boiler / Thermic Fluid Heater (TFH) irrespective of capacity or oil / gas fired boiler >5 TPH	Coal fired boilers have been converted to oil/gas fired drier (preferably with CBM which is available within accessible distance).	More granular data/information needed on nature of industries to suggest strategies.	More granular data/information needed on nature of industries to suggest BATs.
15.	Mining and ore beneficiation	More data/information needed on specific ore type	More data/information needed on specific ore type	More data/information needed on specific ore type
16.	Manufacturing of lubricating oils, grease and petroleum based products	More data/information needed	More data/information needed	More data/information needed
17.	Manufacturing of explosives, detonators, fuses including management and handling activities [including manufacturing of safety match]	More data/information needed on present interventions	Specific Industry EHS Standards	More data/information needed to suggest BATs
18.	Basic chemicals and electro chemicals and its derivatives including manufacturing of acid	More data/information needed on present interventions	Specific Industry EHS Standards	More data/information needed to suggest BATs
19.	Coke briquetting (sun drying)	More data/information needed on present interventions	More granular data/information needed on nature of industries to suggest strategies	More data/information needed to suggest BATs

Sr. no.	Industry type	Existing technology/ process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long term)
20.	Saw mills	More data/information needed on present interventions	Use of cyclones and bag filters to collect fine particulates. The sawdust storage bin or hopper discharge bay to be enclosed on three sides, and a flexible plastic or canvas chute attached to the discharge outlet to prevent unnecessary free fall of the dust into the storage bay. No open burning of wood wastes and residues is allowed	Buffalo Turbine debris blower, use of fluid/atomized mist for airborne dust suppression, use of cyclones and bag filters to collect fine particulates. Use of solar kiln dryers
21.	Railway locomotive work shop / integrated road transport workshop / service centers having waste-water generation >=100 KLD	More information needed on specific industry type along with list of sub-processes	More data/information needed	More data/information needed
22.	Wire drawing and wire netting [including bailing straps, wire drawing by cold process only]	More data/information needed on present interventions	More data/information needed	More data/information needed
23.	Thermal Power Plants	More data/information needed on present interventions	Standard Industry EHS guidelines	More data/information needed
24.	Forging of ferrous and non-ferrous metal (using oil or gas fired furnaces)	Nothing specific, coal-fired boilers to be converted to oil/gas-fired drier. (Preferably with CBM which is available within accessible distance)	More data/information needed as there are techniques for different steps and for different metals	More data/information needed as there are techniques for different steps and for different metals
25.	Rolling mill (gas fired) and cold rolling mill	More data/information needed on present interventions	Pickling of carbon steels, modification of choice of acid as hydrochloric acid gives rise to only about ¼ of the quantity compared to sulphuric acid, which is reported to be still more commonly used	Use of mechanical mist eliminators, packed scrubber for absorptive gas cleaning, lowering bath temperature during pickling
26.	Stone crushers	More data/information needed on present interventions	Methods according to CPCB guidelines	More data/information needed on type of stone

While implementation of BATs in larger units is feasible through proper institutional mechanism, management of smaller units remains a challenge. These MSMEs use several unregulated oils such as recycled oil, tyre oil and furnace oil (FO) causing enormous pollution. Therefore, a list of approved fuels will help to counter such issues across all sectors. A similar initiative is already in place in New Delhi. In response to the concerns over the growing use of pet coke and furnace oil in industry, notification on the emissions standards for SO_x and NO_x have been issued 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.

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 add 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 the cement industries are allowed to use this as feedstock but not fuel. Further, by 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.

Several policy measures have been initiated to address industrial pollution.

- **Stricter location policy** for new industrial units and restriction on setting up of red category industries in municipal area of Kolkata Metropolitan Area (KMA) and Bardhaman district except Jamuria industrial estate. However, with adequate pollution abatement technologies/systems, red category industries can be set up outside the KMA and Bardhaman district.
- **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 in 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 grid connected solar energy in cities for commercial and industrial applications. 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 116,013 LPG connections were issued as of October 2019 by Hindustan Petroleum Cooperation Limited in Asansol. Data from other suppliers is to be collated. This is a welcome move and small-scale units 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 (continuous emission monitoring system) 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.
- **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.
- **Enforcement of new NO_x and SO_x standards in the industry:** MoEF&CC has 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:** As per the process, 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.

Table 6: 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.

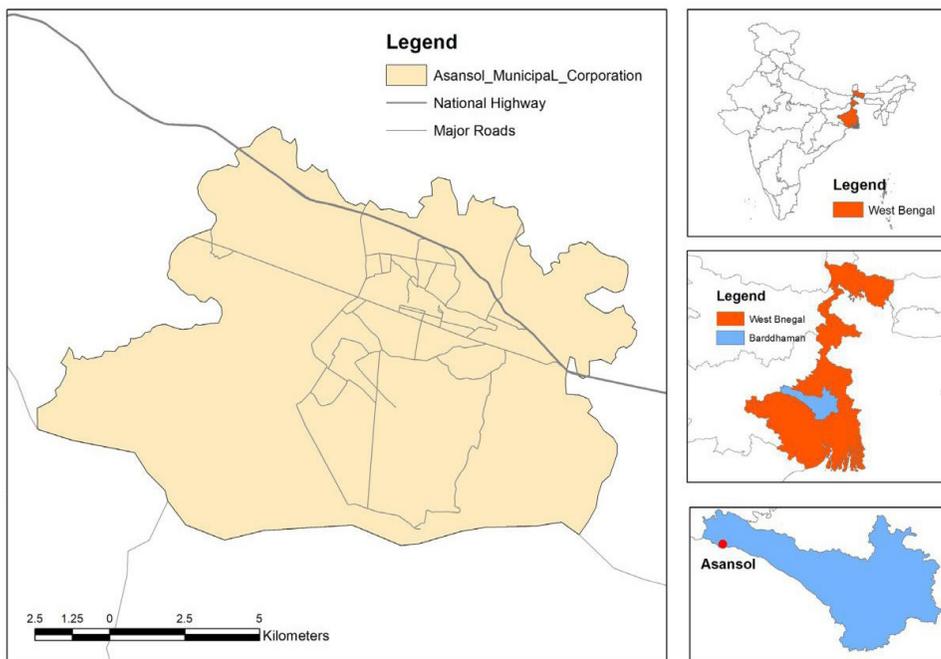
2.2. Brick kilns

The kilns which are in close proximity to the city are all running on traditional technology. It is therefore suggested to phase out conventional brick kilns with the zigzag technology kilns within the next calendar year.

2.3. Vehicles and mobility

The NH-2 is a four-lane major road link, a part of Golden Quadrilateral, which connects AMC area with major urban centers for movement of goods and people. A mix of regional and local traffic is observed on the NH-2, wherein, the goods movement dominates over passenger movement as shown in Map 2.

Map 2: Regional connectivity of AMC

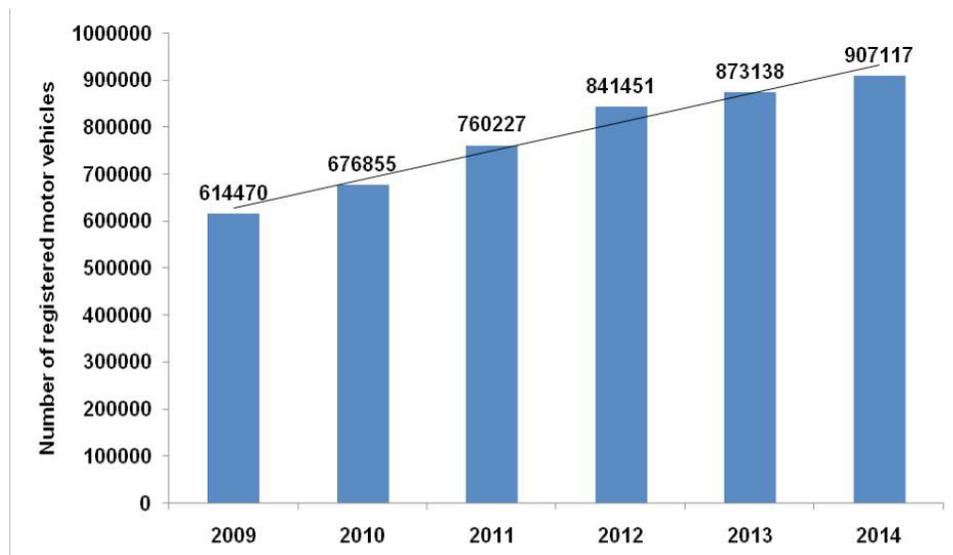


Source: Land Use and Development Control Plan – 2025 for Asansol Sub-division

Urban mobility characteristics

Vehicle registration growth: Due to the lack of vehicle registration data at the municipal corporation level, Pashchim Burdwan district average for vehicular growth has been taken into consideration. The growth rate observed for the district 2012–13 is 3.76 per cent which is low as compared to other districts in West Bengal viz. Purbi Medinipur (25.8 per cent), Howrah (12.8 per cent), North 24 Parganas (16.26 per cent).

Graph 10: Vehicle registration growth in Paschim Burdwan district



Source: Statistical handbook 2013, Department of Planning & Statistics, Government of West Bengal

Trip pattern

The per capita trip generation rate in the AMC area is 1.18, wherein, work-based per capita trip generation rate is the highest (i.e. 0.67). The average trip length in the AMC is 3.1 km. The choice for modes among motorized modes, non motorized-vehicle (NMV) and walking for each trip purpose has been presented in Table 1. It can be observed that the combined share of NMV is quite high compared to motorized trips, primarily due to the short trip length. It is also one of the reasons for high ownership of bicycles (i.e. 72.5 per cent of the total) by households (see Table 7: Mode usage by trip purpose).

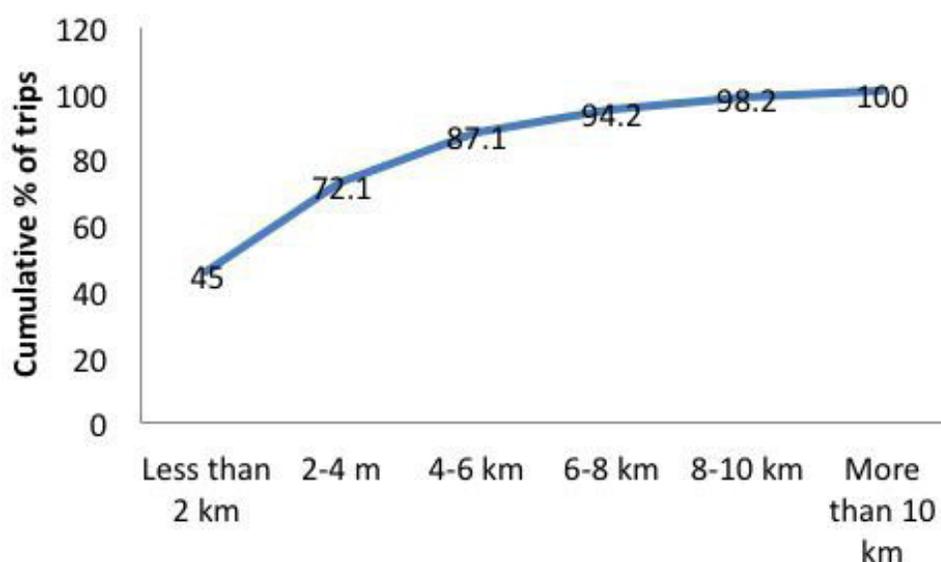
Table 7: Mode usage by trip purpose (all numbers are in per cent)

	Work	Education	Shopping		Health & recreation	Access to the public transport terminal	
			Daily	Monthly		Bus	Train
Motorized	25.5	45	7.2	29.9	57.8	7.9	70
NMV	35.4	13	12.8	15.7	9.3	5.1	17.3
Pedestrians	39.1	42	80	54.4	32.9	87	12.6

Source: Land Use and Development Control Plan – 2025 for Asansol Sub-division

Around 72.5 per cent of the road length in AMC is covered with footpath. Compared to the Service Level Benchmarks (SLB) developed by Ministry of Housing and Urban Affairs (MOUHA), it falls under the LOS ‘A’ category which is excellent. Considering the average trip length of the AMC is 3.1 km, wherein, around 72.1 per cent of the trips end within 4 km, the city shows a high potential of non-motorized transport (NMT) as majority of the trips fall within cyclable distance (see Graph 11: Cumulative percentage of trips verses trip distance).

Graph 11: Cumulative percentage of trips versus trip distance



Source: Land Use and Development Control Plan – 2025 for Asansol Sub-division

Public transport and intermediate para transit (IPT)

AMC does not have any city bus service at present. The intra-state bus service which provides public transport connectivity to AMC is run by South Bengal State Transport Corporation (SBSTC). As per the SBSTC, there are a total of 40 CNG buses operational in Asansol, Durgapur and Raniganj area and all the buses are less than five years old. The operational statistics of the intra-state bus service have been presented in Table 8. Comparing the fleet utilization rate of SBSTC bus service (i.e. 70 per cent) with Karnataka State Road Transport Corporation (KSRTC) (i.e. 92.2 per cent) which is considered one of the well-performing road transport corporation, it can be inferred that the fleet utilization rate of SBSTC bus service needs to be improved.

Table 8: Operational statistics of SBSTC

Fleet utilization	Average frequency	Average daily ridership	Fuel efficiencies (km/unit of fuel)	Load factor	Breakdown rate	Other upgrade
70%	25 minutes	2912	4.75 km/kg	80%	1.25%	NA

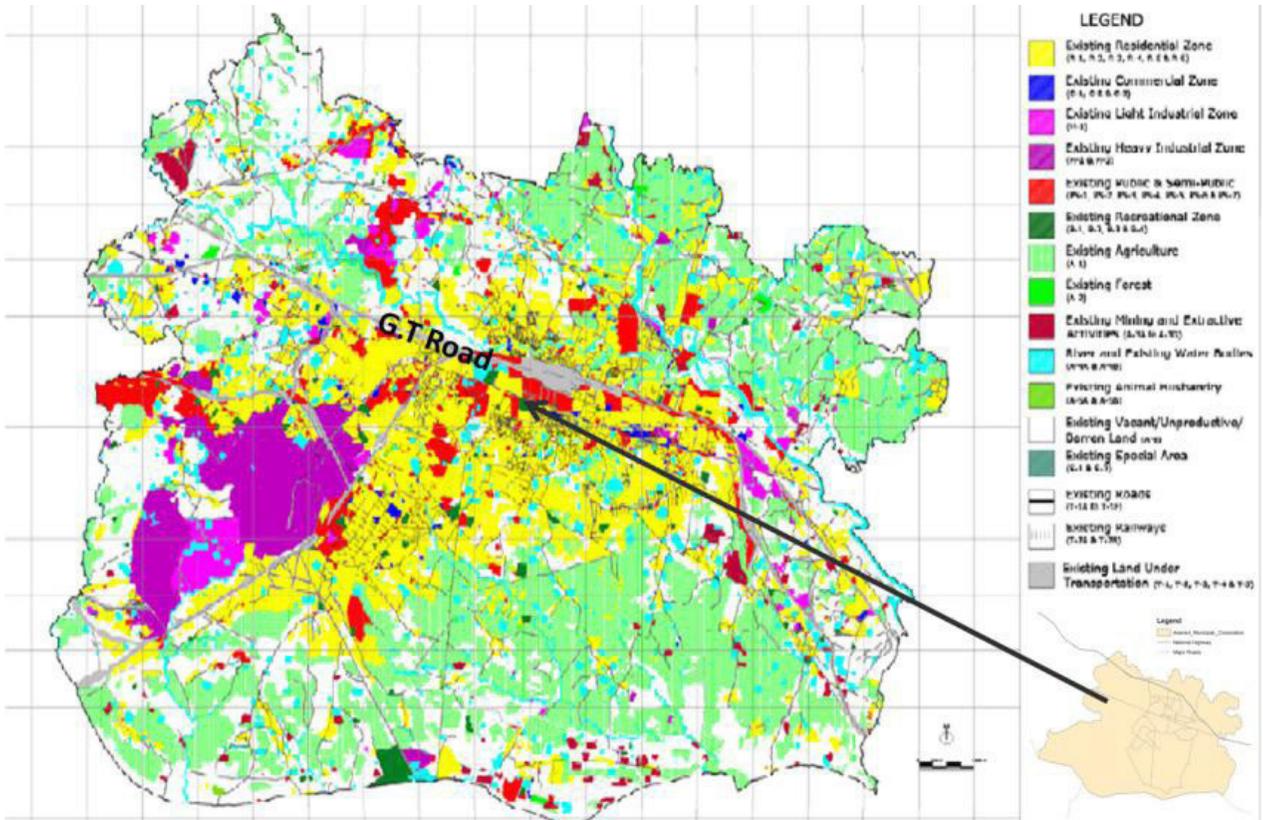
Source: Transport Department, West Bengal

Urban mobility issues

The economy of Asansol Municipal Corporation is heavily dependent on the steel and coal industries due to which freight composition is high on the roads. The movement of freight along with local traffic often leads to traffic congestion. Some of the major urban mobility issues in AMC are discussed below.

The centralization of urban functions in AMC is one of the major reasons for increasing traffic congestion. Over the past few years, the centralization of activities in the form of ribbon development has been happening along the GT road. The creation of bypass has diverted the regional traffic but

Map 2: Centralization of activities around GT Road



Source: Land Use and Development Control Plan – 2025 for Asansol Sub-division

wholesale and warehousing activities are still located along the GT Road. The city bus stand is also located on the GT Road and long overdue for relocation. Due to the aforementioned reasons, traffic volume exceeds road capacity, thereby causing traffic congestion (see *Map 2: Centralization of activities around GT Road*).

The freight movement is allowed at night time on GT road; however, considering the rapid growth of IISCO plant and wholesale trade and commerce, the solution seems to be unsustainable.

Future mobility proposal by AMC

The AMC has proposed a 17-floor Multi-Level Car Parking (MLCP) unit in the city at a cost of Rs 25 crore on the Public-Private Partnership (PPP) model. The parking space will have the capacity to accommodate 3350 two-wheelers and 332 four-wheelers and 75 bicycles. The proposed rates will be Rs 5 per hour for two-wheeler and Rs 10 per hour for four-wheeler. The rates are subjected to increase as per the cost recovery condition in the city. MLCP is a capital intensive project constructed to ease the crisis of parking in an area by meeting the parking demand. The utilization rate of the MLCP is significant from the perspective of cost recovery as well as improving the parking condition. Therefore, framing a proper strategy for ensuring its effective utilization is critical.

Experience from other urban areas of India shows that Multi-Level Car Parks normally remain underutilized due to the lack of larger area

planning for integrated management of available off-street and on-street parking. Even if the MLCPs are competitively priced they remain under-utilized as free on-street parking is available around them. Parking on public land is not regulated or priced. Hence, the mere construction of MLCP is not a sustainable solution as it does not guarantee improvement in parking space crisis. There is need for a parking policy that would mandate regulation of public land in order to deter people from parking their vehicles free of cost and promote usage of MLCP.

2.4 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 only in Kolkata in April 2010. It is scheduled to introduce Bharat Stage VI (BS VI) norms and fuels in April 2020 across the state. 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, phasing 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 (PUC) system. 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, such as calibration of equipment and overall compliance with the programme.

At the national level under the direction of the Supreme Court order, the Ministry of Road Transport and Highways is setting up the system to link PUC certificate with the annual vehicle insurance to ensure full compliance with the programme. Such methods and more are needed at the state level to ensure that everyone turns up for the PUC tests.

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 and identification and subsequent action can lead to substantial emissions reduction.

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 is not 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 centre to check if the OBD itself is functioning properly or has been tampered with. The OBD in vehicles has 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 if the OBD is functional.

Regulating movement of heavy duty vehicles: Another area of intervention is the heavy duty truck movement through cities that can contribute hugely to the 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 interventions are needed to design highway alignment in a way that they bypass the highly populated cities and do not cut across them. Truck movement and dust control from loading and unloading will be of special concern in industrial cities and mining areas such as Asansol.

Phasing out of old vehicles: Currently, cities in West Bengal except Kolkata do not have age restriction on vehicles. Vehicles more than 15 years of age are allowed to ply within city limits. After crossing the 15 years registration time frame, these vehicles 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. Regulatory and fiscal measures are needed to discourage use of old vehicle vintage meeting very old emissions standards.

2.5 Solid waste management

Asansol Municipal Corporation reports that approximately 624 MT per day of solid waste is generated. AMC area includes Raniganj, Jamuria and Kulti which consist of 106 wards. Only 56 wards have partial door-to-door collection mechanism. Door-to-door collection has started in all other wards recently but still the enforcement is not 100 per cent. There are five dumping sites in the city. The major one is at Kalipahari in the bypass road which is not a scientific landfill site. This open landfill site is not equipped with the network of pipes that could drain out the methane being generated at the waste dumping site and is now a point source of pollution. The city has one compactor station where all the waste is sent and then everything is directly dumped at Kalipahari whose height is approximately nine meters.

Any instance of natural burning on the landfill site is reported to the municipal corporation. AMC is supposed to take immediate steps to control the fire. The AMC along with various self-help groups has organized many awareness campaigns on the segregation of the waste at source.

Unfortunately, the absence of alternate waste management practices besides traditional dumping, leading to massive open landfills, is 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. 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 also 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)

2.6 Construction and demolition (C&D) waste

With the construction boom and on-going urbanization, generation of construction and demolition waste is on the rise in AMC but there is no scientific estimate of the quantum. The quantum of C&D waste generated in AMC is 125 MT/day. The number of active construction sites and permissions granted in the year 2018–19 was 1478 and in 2019–20 it is 226. Primarily, residential construction is going on in the city. In 2018–19: Residential—1301, Commercial and mixed-use industrial—177 and in 2019–20: Residential—170, Commercial and mixed-use industrial—56.

State policy on construction and demolition waste management is under preparation as per C&D Guideline 2016.

2.7 Suspended road dust

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

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 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 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.

2.8 Crop fires

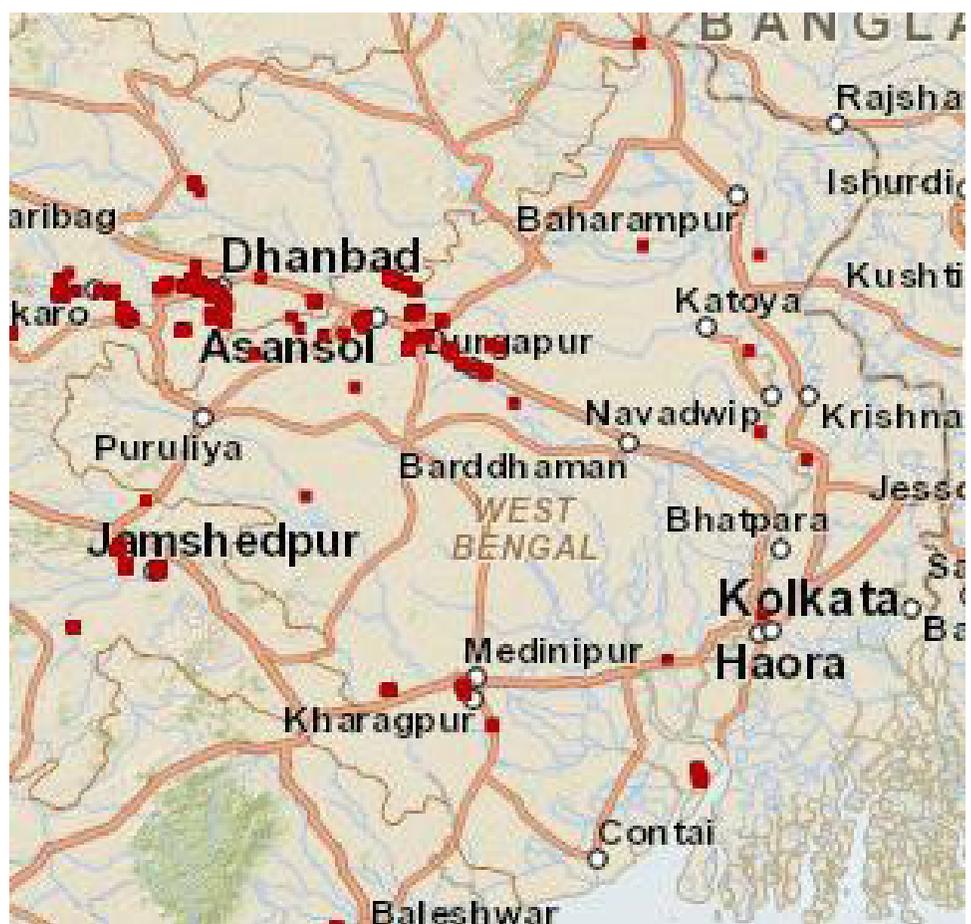
Urban air quality of cities is also impacted by the pollution at the regional level due to trans-boundary movement of pollution. From that perspective any large-scale open fire in the region can have serious impacts. While the impact of the problem of agricultural stubble burning or crop residues is 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, fires during October–March coincides with deterioration in the urban air quality in Asansol.

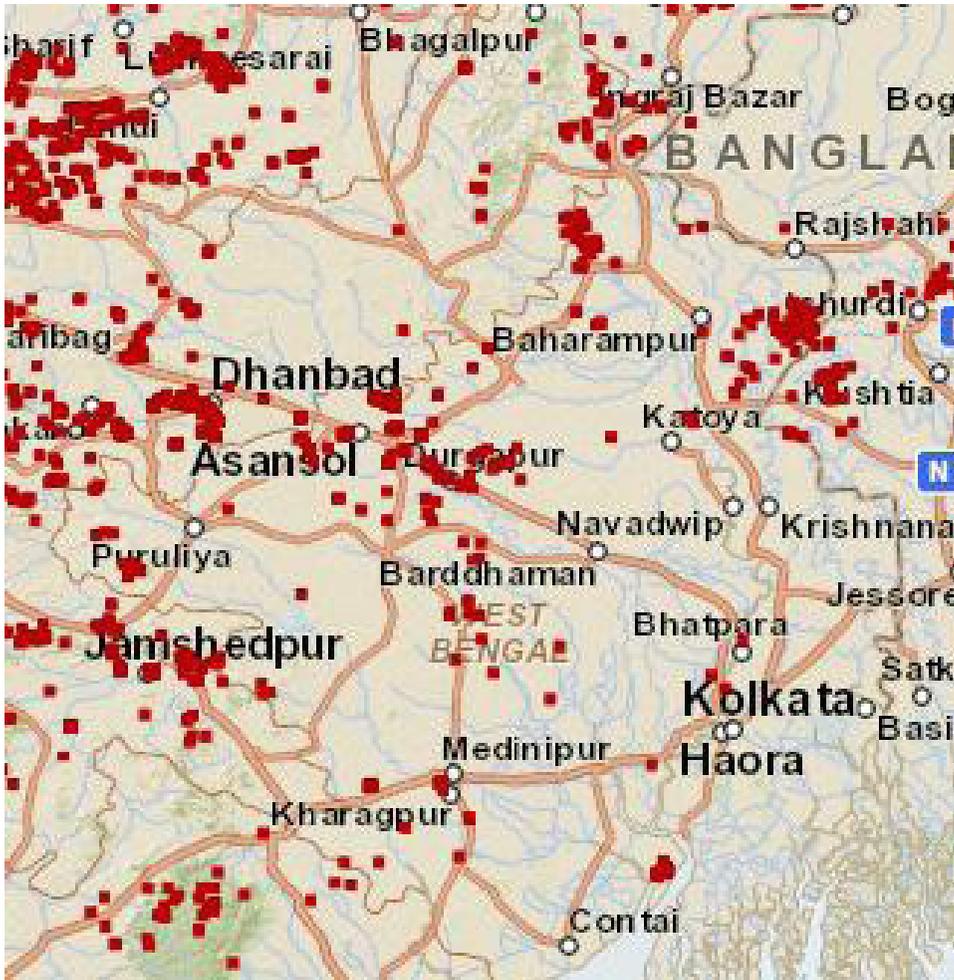
Such incidents are expected with growing mechanization of agriculture. The harvesters leave behind stubble on the field. As farmers find it expensive to hire labourers to cut it, easiest way to dispose it off is to burn it. In northern India—Punjab, Haryana and Uttar Pradesh—this problem is being addressed 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 solves the problem of a short window between two sowing cycles. In addition to this several business models for reuse and recycling of straw are also being devised that include power generation, pellets for industrial boilers, and other products. It is possible to introduce similar models to West Bengal which can prevent the problem of crop burning and open fires. Even farmers will have to be sensitized and made aware that— as studies of Agricultural Research Institute, Pusa in Delhi have shown—that such large-scale burning actually destroy the micro-nutrients in the soil and affect soil fertility.

The following snapshot shows cumulative fire incidences/spots during October 2018.



Source: NASA Firemapper

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



Source: NASA Firemapper

2.9 Pollution from coal fields

Asansol, due to its geographical proximity to Raniganj and Sitarampur Coal Fields, faces some unique challenges. These are in addition to the increased particulate dust and vehicular pollution due to transportation of coal. Generally, coal mines have high recorded RSPM values and acid mine drainage. Instances of land degradation, higher ambient SO_x and NO_x levels and very low plantation density that is crucial to absorb pollutants are common. Most of these mines are open cast mines. Pollution control in coal mines is a challenging topic and multiple cross sectoral issues need to be addressed. It is recommended to commission an exclusive study on the current norms that govern policies in these mines and the status of their implementation in accordance to The Coal India (Regulation of Transfers and Validation) Act, 2000 and The Air (Prevention and Control of Pollution) Act, 1981. Based on the study, remedial measures may be recommended.

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 the industrial town of Asansol. 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 Asansol 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 Actions				
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) Asansol fulfills the criteria of minimum four monitoring stations. (According to Census 2011, the population of Asansol is 5,63,917). The city has one real time and two manual monitoring stations. To fulfil the new criteria as proposed by CPCB now in 2019, 2 CAAQMs and 1 Manual Station shall be installed based on the population of the city. Use air quality sensors at probable hotspots to complement air-quality monitoring (based on CPCB/ MoEF&CC guidelines)	Nodal agency: WBPCB, supported by CPCB	6-12 months	3 crore 10 lakh
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. West Bengal State Pollution Control Board is initiating a study on satellite based assessment.	WBPCB, CPCB, IMD, MoES, and IITM, Pune	6-12 months	To be finalized
Medium-term action				
1.3	Develop capacity for pollution forecasting for implementation of graded response action plan. For e.g., introduction of SAFAR to Asansol. This will also require monitoring of weather data and prior support from MOES and IMD.	MOES, IMD, Department of Environment, WBPCB supported by CPCB and IITM, Pune	18 months	To be finalized

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
Short Term Priority Actions				
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 (SPCB website) and local media.	WBPCB, CPCB, IMD	1 year	Regular activity
1.5	To conduct a source apportionment and emission inventory study for the city, to capture source-wise contribution and seasonal variations in source contribution. Assessment of carrying capacity to be carried out as well. Additionally, the study must assess regional impacts by setting up a mechanism to assess emissions in the airshed.	WBPCB and Department of Environment	18 months	3 crore
1.6	For air shed wide monitoring that may also include rural and peri-urban areas assess the influence area. The National Clean Air Programme (NCAP) from the MoEF&CC has recommended rural air quality monitoring.	WBPCB & CPCB	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 subject to approval of MoEF&CC about use of low cost sensor in AQM.	WBPCB & CPCB	1 year	To be finalized
1.8	Research studies including detailed inventories, health impact studies, exposure impacts, 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 Actions			
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.	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, for each specific type of industry. Carry out regular inspection	WBPCB, Department of Industries Commerce and Enterprises	3 months
2.3	<p>Have a clean fuel policy and provide incentives for clean fuels: For this notify approved fuels. Promote relatively cleaner fuels like gas (Coalbed Methane from Dankuni Coal Complex, natural gas when available) and electricity.</p> <p>Discourage fuels with very high sulphur and heavy metals like furnace oil, pet coke, tyre oil, etc. (except where petcoke is used as feedstock like cement). Need for a favourable taxation and pricing policy to make cleaner fuels more competitive.</p> <p>Incentivize replacement of boilers to switch to cleaner fuels. Clean fuel strategy needed for small and medium-scale units with minimal or no emission control systems. Currently there is no restriction on fuels.</p>	WBPCB, Department of Industries, Commerce and Enterprises, Ministry of Petroleum and natural Gas (MOPNG)	6 months
2.4	<p>Identify the units that need to install CEMS.</p> <p>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 action.</p> <p>Specify the mechanism for quality control and quality assurance of CEMS data and ensure that data is available online as per a specific format 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.</p> <p>This needs to be done for industrial sectors including sponge iron and cement units, iron and steel industries, and jute and rice mills.</p>	WBPCB, Department of Industries, Commerce and Enterprises	6 months
2.5	Identification of cumulative impact of industrial emissions such as total load from a specified area or a particular type of industry. Prescribe more stringent and specific pollution control action for each type of industry. For instance, specific measures for sponge iron units and rice mills each.	WBPCB, Department of Industries, Commerce and Enterprises	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 Industries, Commerce and Enterprises	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 to the newer and more efficient devices.	WBPCB, Department of Industries, Commerce and Enterprises	6 months

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
2.8	Strengthen the current siting policy for industries to be notified in future, in order to address Asansol-wide air quality issues. Exploring the scope of further restricting expansion and diversification of polluting units until air pollution control measures have been implemented.	WBPCB, Department of Industries, Commerce and Enterprises	1 year
2.9	Prepare and implement local area action plan for pollution hotspots and strict enforcement of air pollution control measures in all industries, including those located in unauthorized areas. Build schedule for inspection of areas of concern and reporting.	WBPCB, Department of Industries, Commerce and Enterprises	1 year
2.10	Training and Awareness Program for onsite emergency preparedness and environmental issues.	WBPCB, Department Of Industries, Commerce and Enterprises	1 year
2.11	Construction of paved roads around all major industrial belts and estates. Installation of dust suppression system. Provision for water sprinkling and dust mitigation.	WBPCB, Department Of Industries, Commerce and Enterprises, ADDA	1 year
2.12	Development of adequate greenbelt around all major industrial estates by planting 1000 saplings.	WBPCB, Department Of Industries, Commerce and Enterprises, ADDA	1 year

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

Sr. no.	Action points	Agency responsible	Timeline
3.1	There are 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.	L&LR Department, WBPCB, Department of Industries, Commerce and Enterprises	6 months
3.2	Relocate any hot-mix plants to areas outside Asansol boundaries. Shut down small and mobile hot-mix plants	AMC, WB PWD, NHA1 and other road operating agencies	Immediately
Medium-term action			
3.3	Convert all brick kilns to rectangular design zigzag technology– from FCBT natural draft kilns to induced draft kilns with rectangular zigzag design.	L&LR Department, WBPCB, Department of Industries, Commerce and Enterprises	1 year
3.4	Prescribe design specifications for improved kilns and ensure compliance checking. Ensure conversion has actually taken place. Ensure provision of infrastructure in terms of viewing platform and chimney emission testing point for compliance.	CPCB, MoEF&CC, WBPCB, Department of Industries, Commerce and Enterprises	1 year
3.5	Identification of stone crushers that are close to the city, if any; adopt stringent dust control measures and greening	District Administrations WBPCB, Department of Industries, Commerce and Enterprises	6 months
3.6	Establish a protocol for using cleaner fuels & technology for asphalt mixing and minimizing the number of hot-mix plants.	MoRTH, MoEF&CC, AMC, WB PWD, NHA1 and other road operating agencies	2 years

4. ACTION ON POWER PLANTS

S No	Action points	Agency responsible	Timeline	Current Status
	Power Plants standards notified in 2015 for PM, SO _x , NO _x , should be met by 2022. Power plants are responsible for enforcement of NO _x reduction strategies as per CPCB guidelines	WBPCB and Plant management	2022	Actions to comply with standards have already commenced.
4.1	Santaldih Thermal power Station – 500 MW The power station has two units of 250 MW commissioned in 2007 and 2011 respectively.	WBPCB & WPDCL By Feb 2020 By June 2020 By June 2020 By December 2020 By September 2021 By Feb 2020	2021	Power Station is operating at 75-90 per cent plant load factor. Plant complies with the particulate matter norms. Feasibility study under way to meet new norms.
4.1.1	Step 1: Collect major milestone plan/Gantt chart for FGD installation, NO _x control and measures to meet water norms			
4.1.2	Step 2: Prepare action plan for monitoring at relevant intervals, issue notice to collect a suitable bank guarantee amount – 1 per cent of the project cost			
4.1.3	Step 3: Collect bank guarantee, engineering documents – for FGD, NO _x control and measures to meet water norms			
4.1.4	Step 4: Ensure civil works are completed			
4.1.5	Step 5: Performance and guarantee (PG) test for FGD to be initiated			
4.1.6	Step 4: Ensure civil works are completed			
4.1.7	Step 5: Performance and guarantee (PG) test for FGD to be initiated			
4.2	Raghnathpur Thermal Power Station – 1,200 MW The power station has two units of 600MW. The plant was commissioned recently. It has to meet the emission norms by 2022.	WBPCB & DVC By Feb 2020 By March 2020 By July 2020 by January 2021 by June 2022		Plant is operating at low plant load factor 40-60%. It is currently meeting PM norms, tender has been awarded for FGD, NO _x implementation plan is unavailable in public domain.
4.2.1	Step 1: Collect major milestone plan/Gantt chart for FGD installation, NO _x control and measures to meet water norms			
4.2.2	Step 2: Prepare action plan for monitoring at relevant intervals, issue notice to collect a suitable bank guarantee amount – 1 per cent of the project cost			
4.2.3	Step 3: Collect bank guarantee, engineering documents – for FGD, NO _x control and measures to meet water norms			
4.2.4	Step 4: Ensure civil works are completed			
4.2.5	Step 5: Performance and guarantee (PG) test for FGD to be initiated			
4.4	Fuel quality improvement			
4.4.1	Advice use of low sulphur coal (coal with sulphur content less than 0.2 per cent), co-firing of coal with biomass. On availability of natural gas switch-over coal-based power stations to natural gas-based power stations.			

5. ACTION TO REDUCE VEHICULAR EMISSIONS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
5.1	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 prepare to comply with the order of Hon'ble Apex Court.	Transport department	Action started
5.2	ALTERNATIVE CLEAN FUEL POLICY FOR VEHICLES		
Medium-term action			
5.2.1	Assess the potential of expanding the gaseous fuel programme: Replace diesel three wheeler & taxi fleets with LPG/CNG/Electric fleet – as applicable. Expand refuelling infrastructure for delivery and use. GAIL is expected to expand natural gas grid to West Bengal. Prepare roadmap be linked to that. Around 569 gas driven Auto rickshaws operate at Assansol city.	Transport department, Department of Industries, Commerce and Enterprises Ministry of Petroleum and Natural Gas (MOPNG)	1-2 years
5.2.2	Target medium and short-term goals for electrification of targeted fleet of new vehicles in specific segments using a mixture of mandates and subsidies. - Seek to drive rapid adoption of Battery Electric Vehicles (BEVs) in a manner where they contribute to 25% of all new vehicle registrations by 2023. Build on the central policies - NEMMP & FAME as well as state level policy for electric mobility. - Provision of additional state subsidy for procurement of electric vehicles - 100% Exemption of duty/tax on electricity tariff for an initial period of 5 years for EV manufacturers (vehicle and battery) - Encourage e-auto-rickshaws as IPT - To facilitate rapid adoption of Battery Electric Vehicles, reform permit system and motor vehicles tax to allow exemption for initial 5 years.	Transport department, Department of Power & NES, Central policy guidance from DHI, NITI Aayog	1 year
5.2.3	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 Power & NES, Central policy guidance from DHI, NITI Aayog	1 year
5.2.4	Explore the feasibility potential of generating biogas from waste and sewage to run buses in cities	Transport Department, Department of Power & NES, oil marketing companies	1 year

Sr. no.	Action points	Agency responsible	Timeline
5.2.5	Introduce favourable fiscal measures to promote clean fuels and vehicles and zero emissions vehicle such as reduction in road tax. (Ref: 4.2.2).	Department of Transport, Power & NES and Finance	1 year
5.3	EMISSION CONTROL MEASURES FROM ON-ROAD VEHICLES		
Short-term priority action			
5.3.1	Plan and implement adequate number of PUC centres for emissions testing of on-road vehicles. Strengthen periodic auditing and oversight of PUC centres, calibration of equipment and third party checks. 38 PUC centres are currently operational in Asansol city.	MoRTH, Transport Department	Immediate
5.3.2	Link PUC certificates with mandatory third party insurance for vehicles or any other method for 100 per cent compliance. Develop a mechanism for ensuring that no vehicle is allowed to ply without valid PUC certificate. Ensure real-time updates for all WB registered vehicles with the VAHAN database for compliance.	Transport Department, MoRTH	Immediately*
5.3.3	Improve and enforce PUC programme: The universal linking of PUC centres with remote server to eliminate manual intervention in PUC testing may be leveraged for stronger implementation. Testing of all notified emissions parameters including Lambda testing for petrol cars as notified by MORTH in 2004 and subsequent notification on PUC norms for BS VI vehicles to be implemented. PUC Centres must upgrade to BS VI norms	Transport Department	Immediate
5.3.4	Upgrade in-use emissions testing for petrol and diesel vehicles by using additional methods of screening such as remote sensing.	MoRTH, ARAI, Transport Department	6 months to 1 year
5.3.5	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 are 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 a 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 programs and auditing of PUC centres to check for preparedness for BS VI norms.	Transport Department	6 months to 1 year
5.3.6	Enforcement against visibly polluting vehicles: remove them from road, impose penalty, and launch extensive awareness drive against polluting vehicles.	Transport Department, Traffic Police	Action Started
5.3.7	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 at Nilgunge, Barrackpore and in Durgapur SBSTC premises.)	Transport Department, MoRTH	6 months to 1 year

Sr. no.	Action points	Agency responsible	Timeline
5.3.8	Explore the scope of phasing out old vehicles and developing 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.	Transport Department, MoRTH, CPCB	2 years
5.4 Freight transportation			
Short-term action			
5.4.1	Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue. Adopt freight master plan to organize freight movement and logistics.	District and local administration, Municipal Corporation	Within 6 month
5.4.2	Provide truck rest areas/parks along national and state highways to prevent entry of trucks into cities during peak hours. Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue. Pave all roads to control fugitive dust	PWD, NHAI	Within 6 months
5.4.3	Introduce age and emission standards based restrictions on the operations of commercial vehicles within the city.	NHAI, District and local administration	Within 6 months
5.4.4	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 the same is expected for Asansol.	District and local administration, Transport department, Traffic Police	Within 6 months
5.4.5	Create management systems for loading and unloading of goods in city areas.	District and local administration, Transport department	6 months
5.4.6	Ensure fitness and roadworthiness of trucks and compliance to set standards would be adopted and enforced. Important for industrial cities. 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			
5.4.7	Promote high capacity trucks for long-distance freight transport of mining material instead of smaller trucks.	NHAI, District and local administration	Within 6 months
5.4.8	Diversion of truck traffic: Check feasibility of diversion of non-destined trucks into the city. Alternate routes need to be identified and improved to ensure that non-destined commercial traffic does not enter the city.	District and local administration, Transport department, Traffic Police	Within 6 months
5.4.9	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 at entry points, identification by vintage, emission norm compliance, etc. This allows considering 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
5.4.10	Develop urban freight consolidation centers in relation to location of warehouses relative to suburban areas.	District and local administration, Transport department	1 year
5.4.11	Prepare a freight master plan: Prepare a detailed logistic plan which includes detailed assessment of freight connectivity, requirement of dedicated freight corridor and allied freight infrastructure such as logistic park/truck terminals, cold storage facilities, warehouses, etc.	Transport Department, Railways	1-3 year
5.5	Prepare an action plan to check fuel adulteration and carry out 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.	Transport department, MVD, MoPNG, and Oil marketing companies	6 months
5.6	EMISSION CONTROL AT REFUELLING STATIONS: Install vapor recovery systems in refuelling outlets to reduce benzene and VOC emissions in cities. CPCB has issued direction for installation of Stage I and Stage II vapor recovery systems 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

6. URBAN MOBILITY

Sr. no.	Action points	Agency responsible	Timeline
6.1	Public transport system		
Short term action			
6.1.1	Improve public transport service infrastructure (Bus Queue Shelters, installing Bus Post signs, etc.) as per population and service level benchmark.	AMC, Public Works Department (PWD), National Highway Authority of India (NHAI)	6 months
Medium-to long-term action			
6.1.2	Introduce organized public transport service connecting Asansol, Raniganj municipality and Durgapur of appropriate fleet size and desirable bus type replete with Global Positioning Device (GPS) and passenger Information System (PIS). Approximately 250 buses shall be required in the first phase (as per the thumb rule of the Ministry of Housing and Urban Affairs)	Asansol-Durgapur Development Authority (ADDA), AMC, PWD	18 months
6.1.3	Designing the major interchange location in such a way that it helps in smooth transition of commuters from one mode to another mode (specifically bus & IPT integration).	AMC, PWD, NHAI	18 months
6.2	Intermediate Para Transit (IPT)		
Short term action			
6.2.1	Prepare an operational plan for IPT services for the city which shall include route details, operation period, no. of IPT services allowed in each route, IPT parking area, etc., standardize IPT fares and enforce the safety standards for IPT.	ADDA, DMC, Traffic Police, RTO – Transport Department	6 months
6.2.2	Upgrade the infrastructure to provide training to IPT drivers. At present Asansol MTS train IPT drivers.	RTO – Transport Department	6 months

Sr. no.	Action points	Agency responsible	Timeline
6.2.3	Earmark all the existing and proposed IPT parking locations in separate colour code provided in the central Road Marking Manual. Install a IPT sign post with Origin-Destination, no. of IPT parking allowed and IPT operation timing.	ADDA, AMC, PWD	6 months
6.2.4	Enforce rules for IPT service providers especially with regards to emissions norms.	RTO, Traffic Police	6 months
Medium Term			
6.2.5	Promote e-rickshaws as feeder services to the proposed AUA bus services to facilitate first and last mile connectivity and designate e-rickshaw parking location adjacent to bus stops (wherever possible)	Bus SPV / AMC	1-3 years
6.2.6	Prepare a policy framework for future IPT development, with specific consideration on limiting no. of IPT modes, restricting >15 years old vehicles to ply and laydown detailed steps for diesel to electric conversion.	State Govt. / AMC	1-3 years
6.3	Adaptation of electric mobility		
Short term action			
6.3.1	Prepare an incentive based (financial) electric rickshaw/auto-rickshaw scheme over and above the incentives provided by State (if possible) for the quicker adaptation of electric mobility in the city.	AMC / Regional Transport Authority	6-12 months
6.3.2	Promote e-rickshaws and electric auto-rickshaws as feeder services to the proposed AUA bus services to facilitate first and last mile connectivity.	Bus SPV / AMC	6 months
6.3.3	Prepare regulatory mechanism for provision of dedicated parking space for electric rickshaws/vehicles.	AMC	1 year
6.3.4	Take initiative to develop electric ecosystem such as charging infrastructure, better tariff regime, etc.	AMC / Electricity department	1 year
6.4	Road design		
Medium to long term			
6.4.1	Non-motorized transport and safe access		
6.4.1.1	Prepare and implement plans for developing an NMT network. This should include following action: <ul style="list-style-type: none"> •Pedestrian infrastructure shall be designed based on the Indian Road Congress (IRC): 103-2012. •Target specific length 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: 103 -2012. 	ADDA, AMC, PWD	1-3 years
6.4.2	Multi-Utility Zones (MUZ)		

Sr. no.	Action points	Agency responsible	Timeline
6.4.2.1	<p>Taking cognizance of the proposed land use map for AMC, MUZ is recommended on existing as well as proposed major and minor arterial roads. It will help in bifurcating centralized development of activities along the G.T. road. All the stationary elements on the street shall be organized in a dedicated space which results in obstruction free streets. This should include the following elements.</p> <ul style="list-style-type: none"> •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. <p>Reference: Urban Street Design Guidelines Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre prepared by Delhi Development Authority.</p>	ADDA, AMC, PWD	1-3 years
6.5	Taking cognizance of the proposed land use plan for the AMC, compact city development shall be adopted to reduce distances and improve access.	ADDA, AMC, PWD	3 years
Medium-to long-term action			
6.5.1	Adopt compact urban form for new development to create high density, mixed-use, mixed-income development and accessible dense street network to reduce travel distances and emissions.	ADDA, AMC	12 months
6.5.2	In low density areas as well as new development and urban sprawl maximize densities with good transport connectivity, in order to facilitate maximum number of people walking or cycling, or use NMT or feeder services easily to access public transport.	ADDA, AMC	12 months
6.5.3	Enable a balanced mix of jobs and housing along bus corridors coupled with caps on parking supply and higher housing affordability. Design these spaces with adequate green spaces.	ADDA, AMC	12 months
6.6	Maintenance and Management of Parking Places Rules: Implement Parking Area Management Plan (PAMP) for all delineated neighbourhoods and land uses for demarcation of all types of legal parking spaces for all modes as well as essential street amenities – on-street, off-street and multi-level parking facilities, vending zones, multi-modal integration facilities, green open spaces along with the allied traffic and pedestrian/ NMT circulation plans, signage plans and pricing strategy. PAMPs to be prepared in consultation with local stakeholders, planning bodies/departments.		
Short-term action			
6.6.1	Demarcate the emergency vehicle route on all public roads within the neighbourhood. Demarcate on ground legal on-street parking based on the local area plan.	ADDA, AMC	6 months
6.6.2	Ensure no parks and green areas are converted to parking	ADDA, AMC	6 months
6.6.3	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.	ADDA, AMC	
6.6.4	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.	ADDA, AMC	6 months

Sr. no.	Action points	Agency responsible	Timeline
6.6.5	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 parking demand.	ADDA, AMC	6 months
Medium- to long-term action			
6.6.6	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	ADDA, AMC	1-3 years
6.6.7	Penalty for illegal/wrong parking esp. parking within the emergency lanes and non-designated areas to be prohibitive.	ADDA, AMC	1-3 years
6.6.8	Bundle existing and planned public parking facilities and on-street and off-street parking (including multi-level) facilities for management by a single agency/operator. Any new stand-alone parking only sites need to be linked with the parking area management plan.	ADDA, AMC	1-3 years
6.6.9	Earmark a part of parking revenue for local area improvement that includes footpaths, public amenities, and parking facilities within the PAMP area.	ADDA, AMC	1-3 years
6.6.10	Introduce residential parking permit for regular parkers for use of public parking space and these may be monitored.	ADDA, AMC	1-3 years
6.6.11	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 is made available for shared parking facility.	ADDA, AMC	1-3 years
6.6.12	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.	ADDA, AMC	1-3 years
6.6.13	Plan and implement parking provision for buses, commercial vehicles, and IPT-NMT modes and for the differently-abled.	ADDA, AMC	1-3 years
6.6.14	Parking charges should be optimal and ensure that at least 85 per cent of the available parking spaces are occupied during peak time. About 15% of parking spaces can be vacant and available at any time to encourage short term parkers.	ADDA, AMC	1-3 years
6.6.15	Introduce and further upgrade variable time-based pricing, as per market demand. Coordinated off-street and on-street / surface pricing in commercial and residential areas, and parking permits in residential areas. Parking should be charged as per duration, location in city and size of the vehicle. Parking rates (even if differential) should be applied to the entire PAMP area and not to a few streets.	ADDA, AMC	1-3 years
6.6.16	Multilevel parking structure shall be equipped with smart technology such as real-time information on vacant parking slots, smart meters, etc.	ADDA, DMC	1-3 years
6.7	Traffic management		
6.7.1	Conduct independent/third party audit of geometry of all city roads and intersections and provide specific solutions.	ADDA/ Traffic Police	1-2 years
6.7.2	Conduct audit of all intersections and install functional traffic signals at all major intersections.	ADDA, Traffic Police	1-2 years
6.7.3	Enforce lane driving through heavy fining	Traffic Police	1-2 years

Sr. no.	Action points	Agency responsible	Timeline
Medium-to long-term action plan			
6.7.4	Prepare Traffic Impact Assessment (TIA) guidelines and permit new developments based on the formulated TIA guidelines. Prepare traffic management plan for special days such as during Durga Puja festival / during urban flood situation.	Transport/Traffic Police/ ADDA	1 year
6.8.1	Permit new developments based on the impact of traffic on the surrounding transport infrastructure and neighbourhoods.	AMC/SEIAA	1-3 years
6.8.2	Make necessary infrastructure augmentations based on traffic impact assessments and levy costs to the developer, if needed and possible.	AMC, Traffic police	1-3 years
6.9	Financing of urban transport		
Medium-to long-term action			
6.9.1	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, AMC	1-3 years
6.9.2	Rationalization and reallocation of funds from road capacity augmentation projects towards public transit systems and complete streets.	Transport Department	1-2 years
6.9.3	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, AMC	1-3 years
6.10	Data on urban commute		
Medium-to long-term action			
6.10.1	Regular update of the database and information would be one of the important tasks. This will require standardization of database for recording of travel and transport related activities to be able to assess travel activities—generation of daily number of trips, nature of travel demand, and share of different travel modes, average trip distance, and changes in modal share.	Transport Department, AMC	1-3 years

7. GENERATOR SETS

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
7.1	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.	WBPCB, Municipal Corporation, Police	6 months
7.2	Curtail use of DG sets in social events by providing temporary electric connections. Also restrict use of DG sets during high pollution episodes.	WBPCB, Municipal Corporation, Electricity supply agency	6 months
Medium-term action			
7.3	Alternate power systems should be promoted in cell towers, and use of DG sets discouraged.	Department of Power & NES, Distribution Companies	1 year
7.4	Leverage rooftop solar programme to reduce dependence on DG sets.		1 year
7.5	Ensure access to quality electricity supply.		1-2 years

8. OPEN BURNING (INCLUDING SOLID WASTE AND AGRICULTURAL RESIDUES)

S. no.	Action points	Agency responsible	Timeline
Short-term priority action			
8.1	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.	Municipal Corporation, Development Authority, Resident Welfare Associations, WBPCB	6 months
8.2	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.	Municipal Corporation, Development Authority, Resident Welfare Associations, WBPCB	6 months
8.3	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.		6 months
8.4	Use of satellite based monitoring as well as mobile spot check squads for enforcement.		Municipal Corporation, Metropolitan Development Authority, RWAs, State Police Department, WBPCB
8.5	Proper management of landfill sites at Kalipahari to prevent spontaneous fire,. Further dumping of waste at open landfill sites should be restricted.		
8.6	Adopt roadmap for zero landfill policy to promote decentralized waste segregation, reuse and recycling.		
8.7	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.	Municipal Corporation, Metropolitan Development Authority, RWAs, State Police Department, WBPCB	6 months

9. COMMON BIOMEDICAL TREATMENT FACILITY

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
9.1	Implement emission norms for incinerators and examine the feasibility of less polluting alternatives in compliance with biomedical waste treatment rules.	WBPCB, Municipal Corporation, incinerator facility operators	6 months
9.2	Implement CEMS for incinerators and provide data on emissions on an open platform progressively.		
9.3	Develop a siting policy for biomedical incinerators.	WBPCB, supported by Municipal Corporation	6 months

10. COOKING FUELS AND OPEN EATERIES

Sr. no.	Action points	Agency responsible	Timeline
10.1	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
10.2	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.	Department of Power & NES, municipal corporation, urban local bodies	1-2 years

11. ROAD DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
11.1	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.	District and local administration, PWD, road owning agencies	6 months
11.2	Phase-in mechanical / vacuum-based street sweeping wherever feasible; introduce wet / mechanized vacuum sweeping of roads.		6 months
Medium- to long-term actions			
11.3	Implement truck loading guidelines; use of appropriate enclosures for haul trucks; gravel paving for all haul routes.	Department of Transport, Traffic Police	1-2 years
11.4	Maintain pothole-free roads for free flow of traffic to reduce emissions and dust.	Municipal corporation, District and local administration	1-2 years
11.5	Increase green cover in the region. Undertake greening of open areas, gardens, community places, schools and housing societies.	Asansol Municipal Corporation, local bodies, RWAs	1-2 years
11.6	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.	W B P C B , Road Owning Agencies, Department of industries	1-2 years
11.7	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.		1-2 years

12. CONSTRUCTION DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
12.1	Adopt and implement dust control measures for all types of construction — buildings and infrastructure. Apply preventive measures as mentioned in CPCB guidelines. Construction agencies to be made liable. Impose penalty for non-compliance.	Municipal corporation	6 months
12.2	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.	Municipal corporations / Urban Local Bodies	6 months
12.3	Intensify surveillance of construction activities within urban airshed zones during high pollution period.	Municipal corporation, WBPCB	6 months
Medium- to long-term action			
12.4	Notify rules to segregate construction and demolition waste. Provide a network of decentralized C&D waste segregation and collection sites across the city.	Municipal corporation	1-2 years
12.5	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.	Municipal corporation	1-2 years
12.6	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, Municipal corporation	1-2 years

13. EPISODIC EVENTS

Sr. no.	Action points	Agency responsible	Timeline
13.1	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, Department of Agriculture and allied departments, District and local administration	Ongoing
13.2	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 of Petroleum and Explosive Safety Organization (PESO)	Ongoing

14. RENEWABLE ENERGY

Sr. no.	Action points	Agency responsible	Timeline
Medium- to long-term action			
14.1	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.	Department of Power & NES, WBREDA, District and local administration	1-2 years
14.2	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.	Department of Power & NES, WBREDA, District and local administration	1-2 years
14.3	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.	Department of Power & NES, WBREDA, District and local administration	1-2 years
14.4	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.	Department of Power & NES, WBREDA, District and local administration	1-2 years
14.5	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 disbursement.	Department of Power & NES, WBREDA, District and local administration	1-2 years
14.6	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).	Department of Power & NES, WBREDA, District and local administration	1-2 years

15. URBAN GREENS AND FORESTS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
15.1	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 per cent of the new urban redevelopment projects should be set aside for urban green and tree cover. 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.	Forest, ADDA, AMC, PWD, NHAI	1 year

16. IMPROVE TRAINING AND CAPACITY

Sr. no.	Action points	Agency responsible	Timeline
16.1	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.	West Bengal State Council for Science and Technology, Department of Personnel and Training, District and local administration	Ongoing

17. NEED FOR PUBLIC AWARENESS AND COOPERATION

Sr. no.	Action points	Agency responsible	Timeline
17.1	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. Formation of a public grievance redressal portal for redressal of public complaints on air pollution along with a supervisory mechanism for their disposal in a time bound manner.	WBPCB, District and local administration	Ongoing

18. MINING

Sr. no.	Action Points	Agency responsible	Timeline
Short-term action			
18.1	Establishment of Continuous Ambient Air Quality Monitoring Stations.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPC and other MA	6 months
18.2	Covering of trucks even for internal transport of coal in coal fields area. Implement measures for effective dust suppression during mining and allied activities such as crushing, loading, unloading, blasting, etc.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.3	Dust suppression system—sprinkling of hydrophilic solvents so that water can be attracted and dust can be suppressed. Chemicals such as CaCl, MgCl ₂ , sodium silicate can be used as wetting agents. Dust suppression system should be used in hauling roads.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.4	Constant electronic surveillance to enforce water sprinkling.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.5	All the transportation roads, either temporary or permanent, in nature should be blacktopped/concreted with proper drainage facility.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.6	Provide wind-barriers along the coal-transport road, wherever, the transport road is within 500 m of any habitation area.	ECL West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.7	Installation of Closed Conveying Systems for transport of coal from pithead to railway siding.	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.8	Provisions of Vertical Greenery System for Coal Stockyards	ECL, West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.9	Maintain pot hole-free roads for free flow of traffic to reduce emissions and dust.	West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months
18.10	Deployment of adequate number of surface miners. The surface miners are usually fitted with built dust suppression system and eliminate drilling, blasting and sizing coal.	West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months to 1 year
18.11	Commissioning of adequate number of silo loading facilities at railway sidings to achieve minimum 80 per cent rail dispatch of coal through silo loading.	West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months to 1 year

Sr. no.	Action Points	Agency responsible	Timeline
18.12	Dust extraction system—This includes network of suction heads and ducting connected to wet wall cyclone for separating dust from the air stream. Air outlet of cyclone collectors will have to be connected, so as to discharge clean air to atmosphere and collected dust from the cyclone shall be disposed off suitably. All related provisions of the SPCB action plan for critically polluted areas should be implemented.	West Bengal Industrial Development Corporation (WBIDC), WBPCB and other MA	6 months to 1 year

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:

DRAFT 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	

Action 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

*Population is for the municipal corporation

Source: As prescribed by CPCB

Annexure 1

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

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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/-

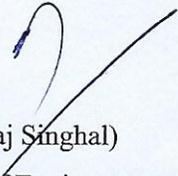
Chief Secretary
Government of West Bengal

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

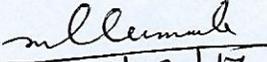
Committee for weekly monitoring of air quality situation, mitigation action and follow up

- 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**