

**State of air pollution: A report card on action taken; to be taken and if there is impact on the quality of air**

**Winter 2017-18**

**Environment Pollution (Prevention & Control) Authority for Delhi (EPCA) and Centre for Science and Environment (CSE)**

**February 28, 2018**

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Delhi and its surrounding region's air pollution is showing first signs of improvement. This is good news. But it is not safe to breathe yet. Air is not clean yet. We must not lose momentum in our fight for clean air. We must not lose the attention that right to breath is fundamental.

The fact is that air in this region of the National Capital is so polluted and highly toxic, that all our combined efforts have reduced pollution from the severe-severe plus category to poor-very poor category. And remember, very poor category is still highly hazardous. According to the health index of the government, prolonged exposure to this level of pollution is hazardous, even for healthy people. This means that all of us breathing this air are exposed to toxins and this will impact our health and more importantly, health of our children. Therefore, we need to do much more to reduce pollution and bring it to the good-moderate level.

But this reduction in pollution levels shows that we can make a difference. The battle against air pollution needs a *comprehensive* plan, *credible* monitoring, *enhanced* implementation and *rigorous* enforcement.

This report card, presents the actions taken till now and the work that needs to be done. It is designed to keep us on track. So, that we can win this battle for our right to clean air.

It is clear that all governments are extremely cognizant of the challenge and are taking measures to reduce deadly air pollution. But it is equally clear that we will need much more enhanced action and at much greater speed.

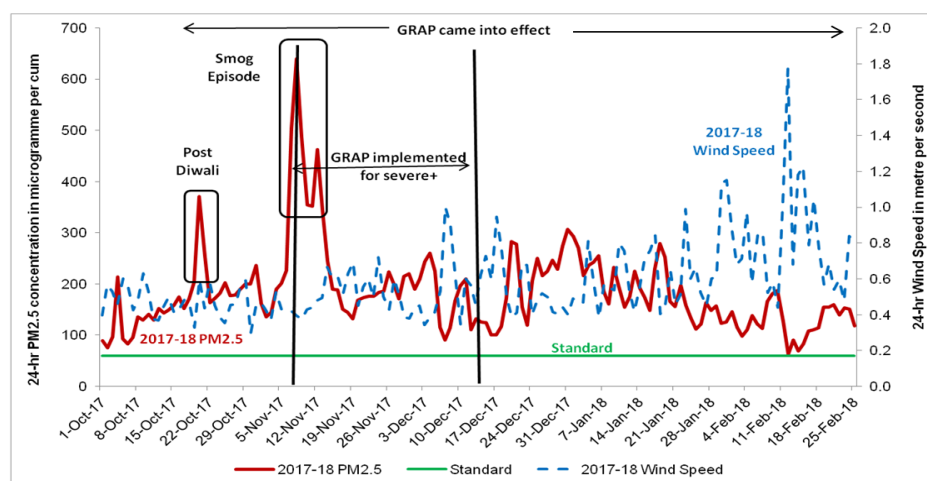
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## 1. Winter 2017-18: Data on air pollution

Air pollution, we know is a factor, of sources of emissions, from combustion to dust and also weather. Delhi and its surrounding regions have high pollution levels in winter, because of the cold and the inversion that takes place. This traps the pollutants close to the ground and does not allow dispersion. This is why we need to monitor wind speed and direction – as winds from west (from beyond Afghanistan, via Punjab) can bring dust or crop residue burning and winds from east can bring moisture. This can combine to create smog incidents, as we have seen in this November of 2017.

**Graph 1: PM2.5 trend from October 1, 2017 to February 25, 2018 for 17 locations in Delhi**

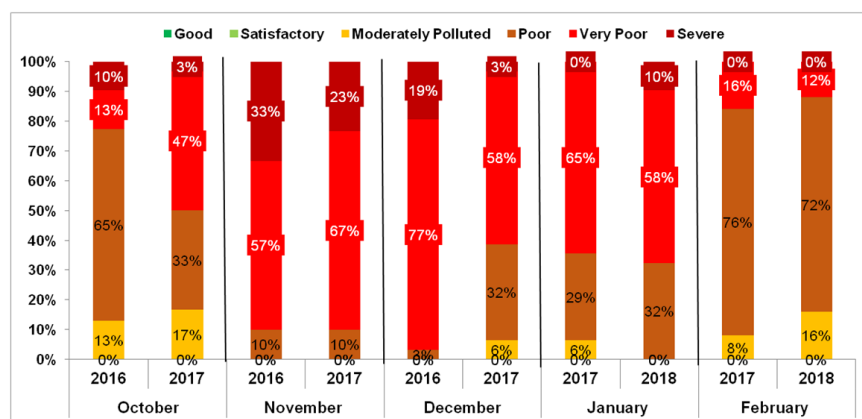


Source: CSE's analysis of CPCB air quality data from 17 monitoring stations

The pollution graph of October 1, 2017 to February 25, 2018 shows the following;

- a. High peak in early October, at the onset of winter and then a smog episode in early November, coinciding with Diwali, crop burning Punjab and wind-storms from western Asia. The highest PM2.5 levels was on November 8, 2017 at 640 microgramme per cum (10.7 times higher than the standard)
- b. Wind levels drop over winter and every time this happens, pollution levels also rise. But levels do not peak. But what is clear is that there is an inverse relation between the PM2.5 concentration and the wind speed. That implies that when wind speed is low, air quality gets worsened.
- c. Our analysis shows that overall wind levels and temperature have remained the same as of last year.
- d. Therefore, there is impact of GRAP – Graded Response Action Plan – the emergency actions that were taken to reduce pollution.

**Graph 2: Analysis of CPCB's Daily AQI bulletin for Delhi 2017-18 and 2016-17**

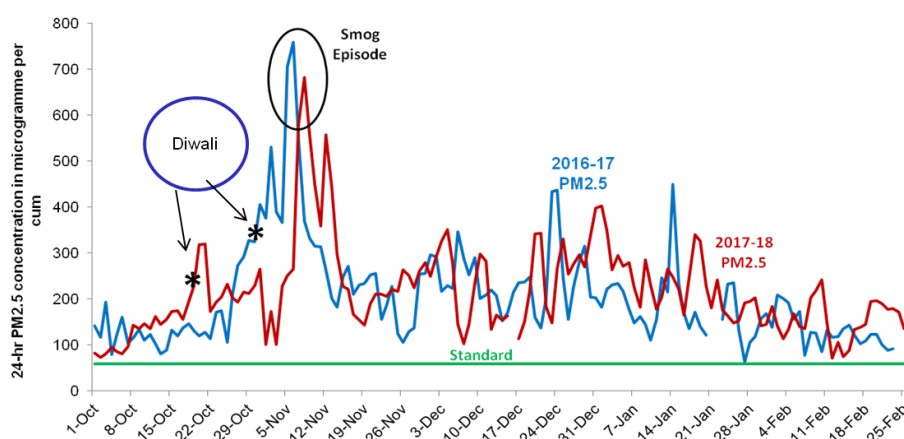


Source: CSE's analysis of CPCB AQI data

This shows the following:

- The number of days in severe category has decreased for each month in comparison to previous year except January. In January 2018, 10% of the days were still in the severe category. But in February, 16% of days were in the moderately polluted category, as compared to 8% in the previous year. As explained before, there is a clear and inverse relationship with weather – wind and temperature – and this plays a role in modulating pollution levels.
- But overall, there is a small difference – the number of days in the poor-very poor category have increased as compared to the very poor-severe category.**

**Graph 3: Comparison of PM2.5 concentration for 4 locations-2017-18 and 2016-17 (data is available for previous year for these 4 stations)**



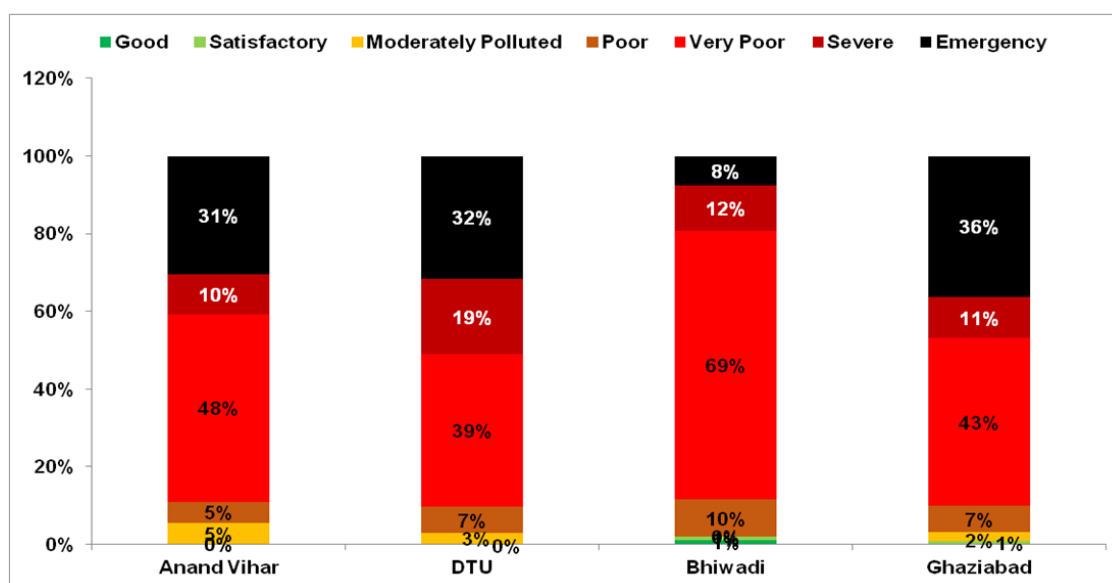
Source: CSE's analysis of CPCB air quality data from 4 DPCC monitoring stations—Mandir Marg, Punjabi Bagh, RK Puram and Anand Vihar

This shows:

- In 2016, the highest PM<sub>2.5</sub> peak went upto 759 microgramme per cum which is 12.7 times higher than the standard whereas the highest peak in 2017 was at 686 microgramme per cum which is 11.4 times higher than the standard – still very toxic and very hazardous.
- Peaks were much worse during last winter. However overall average air quality remains almost same.

Therefore, data from 4 stations, when compared shows that the trend is only slightly better. We must not lose sight of the challenge.

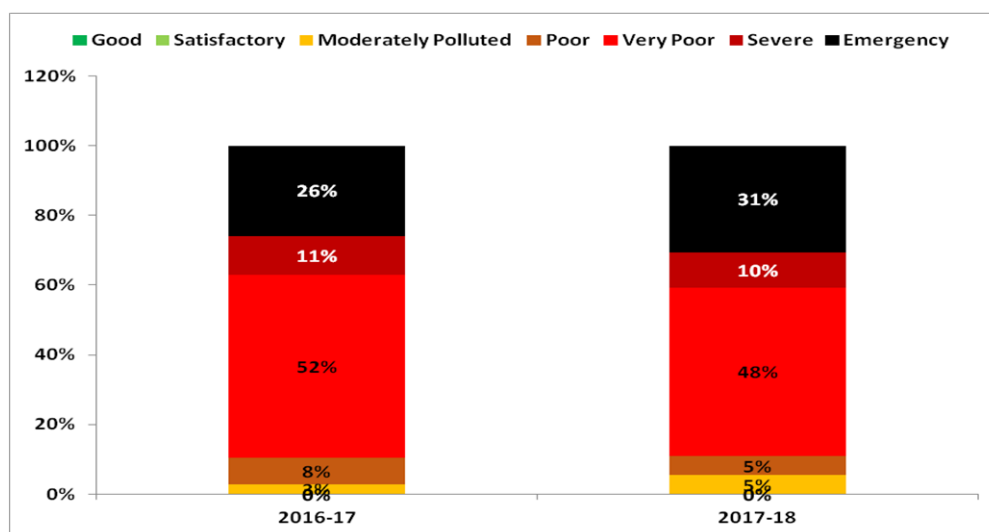
**Graph 4: Analysis of PM<sub>2.5</sub> at the industrial Hotspot location: October 1 2017 to February 25, 2018**



Source: CSE's analysis of CPCB air quality data

- Anand Vihar, DTU and Ghaziabad are the most polluted industrial hotspots where the PM<sub>2.5</sub> levels have been in severe and emergency category for 41%, 51% and 47% of the days respectively throughout the winter period from October 1, 2017 to February 25, 2018.
- Bhiwadi situation is not actually represented because 30% of the data was missing from this station.

**Graph 5: Comparison of PM2.5 levels in one of the hotspot– Anand Vihar**



Source: CSE's analysis of CPCB air quality data

- The data only for Anand Vihar was available for the previous year and it was seen that in 2016-17 the number of days in very poor, severe and emergency category was 52%, 11% and 26% respectively whereas in 2017-18 it was 48%, 10% and 31% respectively.
- A similar trend was observed for both the years. In other words, we are not seeing a difference here, in spite of government's commitment and the action plan developed by EPCA to control pollution. Much greater efforts are needed to reduce pollution in hot spots.

Note: Data gaps in pollution monitoring

**Table 1: A Review of how adequate the monitoring stations are being used for reporting daily AQI**

- Missing AQI data from the CPCB AQI bulleting for respective NCR cities

	Delhi	Bhiwadi	Ghaziabad	Faridabad	Gurugram	Noida
October '17	3%	48%	3%	48%	26%	6%
November '17	0%	13%	3%	3%	0%	0%
December '17	0%	61%	0%	10%	6%	0%
January '18	0%	32%	0%	0%	6%	0%
February '18	0%	56%	0%	0%	0%	4%

Source: CSE's analysis of CPCB daily AQI bulletin

- Total stations in Delhi NCR = 26
- Delhi = 18, Bhiwadi = 1, Ghazaiabad = 1, Faridabad = 1, Gurugram = 1 Noida = 2
- The remaining 2 stations are in Alwar and Rohtak.
- Linking of the new stations is still not done with the online website

## 2. Foundation for effective action

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It is clear that any steps to control pollution will require setting up the foundation for long-term and continued action.

The following has been done:

1. Setting up a Air Quality Index (AQI) and linking the level of pollution to health impacts
2. Setting up an extensive and robust monitoring system that is in the public domain so that we know that is the level and how high and dangerous it is to our health
3. Developing and notifying an emergency action plan – GRAP – where if pollution increases then action is taken immediately.
4. Developing and notifying a comprehensive action plan – CAP – where timelines are given and agencies responsible are identified so that implementation and monitoring is possible.

### 2.1 AQI and health index

National Air Quality Index notified by the government which classifies air quality of a day considering criteria pollutants through color codes, air quality descriptor along with health advisory which is as follows.

**Table 2: National Air Quality Index**

AQI Category (Range)	PM <sub>10</sub> 24-hr	PM <sub>2.5</sub> 24-hr	NO <sub>2</sub> 24-hr	O <sub>3</sub> 8-hr	CO 8-hr (mg/m <sup>3</sup> )	SO <sub>2</sub> 24-hr	NH <sub>3</sub> 24-hr	Pb 24-hr
Good (0-50)	0-50	0-30	0-40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51-100)	51-100	31-60	41-80	51-100	1.1-2.0	41-80	201-400	0.5 –1.0
Moderately polluted (101-200)	101-250	61-90	81-180	101-168	2.1- 10	81-380	401-800	1.1-2.0
Poor (201-300)	251-350	91-120	181-280	169-208	10-17	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+

**Table 3: Likely Health Impacts**

AQI	Associated Health Impacts
Good(0–50)	Minimal Impact
Satisfactory (51–100)	May cause 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/heart diseases. The health impacts may be experienced even during light physical activity

## 2.2 Network of air monitoring stations set up

Delhi has already set up 30 real time monitoring stations by DPCC and CPCB, however, they need to be linked with the online portal. In addition, there are additional stations that will be set up in NCR districts. This work is still ongoing.

Currently on the CPCB website there are 26 air quality monitoring stations in Delhi NCR which includes 18 stations in Delhi.

## 2.3 GRAP: An action plan for emergency action

Based on EPCA's recommendation, the Supreme Court in December 2, 2016 directed MOEF&CC to notify the Graded Response Action Plan (GRAP). This is an emergency action plan. Under GRAP, there are 4 stages of pollution – Moderate to Poor, Very Poor, Severe and Severe+ or Emergency and actions are listed that need to be undertaken as the levels are breached. *GRAP is designed as a response plan to rising pollution and not a substitute for long-term actions.*

Under the notification and directions for the Hon'ble Supreme Court the following system has been set up to implement GRAP:

- a. Expansion of the air pollution monitoring network so that NCR is covered and there is information about the level of pollution and the impact on human health.
- b. The Air Quality Index (AQI) has been established with links to the health advisory. The Index automatically takes the readings of the connected stations and puts out a daily index on the state of pollution.
- c. A task force, headed by CPCB has been set up to meet regularly (daily during the high pollution period) to assess the pollution levels and to deliberate with



the officials of the Indian Metrological Department (IMD) on forecasts. This task force, in turn informs, EPCA on recommendations for action.

- d. It has been agreed that between March to October, when pollution levels are low, the measures listed under the *Moderate to Poor* category would be in effect.

On October 17, 2017 EPCA imposed the “Very Poor and Severe” Category under GRAP in Delhi NCR. The levels of pollution were in the poor and very poor category, but this was done as a precautionary step in view of impending winter and inversion. The decisions were taken and directives issued:

- a. Closure of Badarpur Power Plant from October 17 to March 15;
- b. Closure of Brick kilns that had not converted to cleaner zig zag technology;
- c. Ban on the use of generator sets (in Delhi). The decision to ban generator sets in NCR could not be taken in view of the enormous electricity shortage.
- d. Directions to start preparedness for actions on other measures like closure of hot mix plants, stone crushers, thermal power plants, parking fee enhancement, intensification of public transport etc.

Between October 17 and November 7, 2017, CPCB task force and EPCA convened regularly to assess the situation. There were huge representations for granting exemptions on use of diesel generator sets, including from BCCI, which were turned down.

On the morning of November 7, 2017, CPCB task force informed EPCA that pollution levels had increased alarmingly overnight and that the NCR and city were in the severe category.

On the same day (November 7, 2017) the concentration of PM 2.5 in Delhi was 504  $\mu\text{m}^3$  which is almost 9 times the 24-hour average standard. In the AQI the level was severe. EPCA convened a meeting with all stakeholders and decided to issue the following directives to state governments of Delhi, Haryana, Rajasthan and Uttar Pradesh to do the following:

- a. Closure of all brick kiln, other than those that have been certified to have converted to zig zag.
- b. Closure of all hot mix plants
- c. Closure of all stone crushers
- d. Immediately intensify public transport service, by ensuring there are more buses on road, which are run with reliable service.
- e. Immediately increase frequency of service, including deploying more coaches and introduction of lower fares during off peak hours during this severe period

- f. All state pollution boards to immediately impose fines on all road -constructing agencies where there are inadequate dust control measures.
- g. Intensification of mechanized road sweeper and sprinkling of water
- h. Continue ban on generator sets in Delhi, with exceptions only as defined by DPCC for essential services
- i. Immediate enhancement of parking fee by 4 times and deposit of additional funds in dedicated parking fund with municipalities
- j. Immediate stop all use of unapproved fuels in Delhi and all use of coal and firewood in hotels and eateries
- k. Intensify traffic management in all hot spots and increase deployment of traffic police across the city.
- l. Intensity the enforcement of non-destined goods traffic into Delhi by physically checking all vehicles and turning them back and putting out public announcement of the numbers turned back.

EPCA also informed the state governments that it was monitoring the situation carefully in coordination with the CPCB task force and would inform them of any further measures that would need to be taken. It took the view (as communicated to governments) that it would not direct for closure of schools. Instead it directed governments to inform schools to maintain a strict health advisory and to limit all exposure of children to outdoor activities.

On November 8, the level of pollution spiked further to  $640 \mu/m^3$ , which is 11 times the standard. EPCA directed Delhi governments to:

- a. Stop entry of truck traffic into Delhi (except essential commodities)
- b. Stop construction activities

It also directed Haryana, UP, Rajasthan to stop construction activities till further notice in the NCR districts.

On November 9 2017, the CPCB-task force informed EPCA that weather conditions were expected to improve over the weekend (November 11-12) and so there was no need to advice on further action. EPCA took the view that the administrations already have a major challenge to implement the above directions, which would bring substantial benefits and therefore, given this information, no further directions would be issued. The situation remained the same at the time of filing this report no. 77a in the Hon'ble Court (3 pm, November 13, 2017). It has also been agreed that in future, decisions for actions to be taken, will not depend on the AQI but on the concentration of pollutants.

Based on this experience, the following lessons were highlighted to governments and action taken:

- a. The need for better weather forecasts so that agencies have advance notice of the measures that need to be taken. Based on this, IMD has improved its monitoring, but this is work in progress.

- b. The need for a vastly strengthened system of health advisories to people to take preventive action. Governments have taken steps on this. But there is a need for much greater awareness and information dissemination.
- c. The need for deterrence so that implementation is strengthened. There has been inadequate action on this.
- d. The implementation of the Comprehensive Action Plan for Air Pollution Control for NCR (with the Hon'ble Court) urgently and with time-bound and accountable schedules. This long-term plan for pollution abatement is essential for GRAP to work. MOEF&CC is expected to notify the plan very soon and to start monitoring implementation.

#### **2.4 Comprehensive action plan for Delhi NCR**

Comprehensive action plan made, which will be notified soon

The Supreme Court directed EPCA to work on a comprehensive action plan for air pollution control. It also directed that all agencies responsible for taking action should be identified and timelines given. *CAP lists medium and long-term actions for all pollution sources for Delhi and NCR.* CAP has been formulated with participation of concerned governments of NCT and NCR. This details the strategies for implementation and monitoring for all key sources of pollution - including vehicles, power plants, industry, construction, waste burning, solid fuels in domestic and hotel sectors, among others.

The Supreme Court on December 13, 2017 directed the MOEF&CC to finalise the timeline, notify and implement the recommendations. In compliance the Central Pollution Control Board on January 25, 2018 has directed the concerned states/ departments to implement the action points which have specific timeline under the Environment Protection Act 1986.

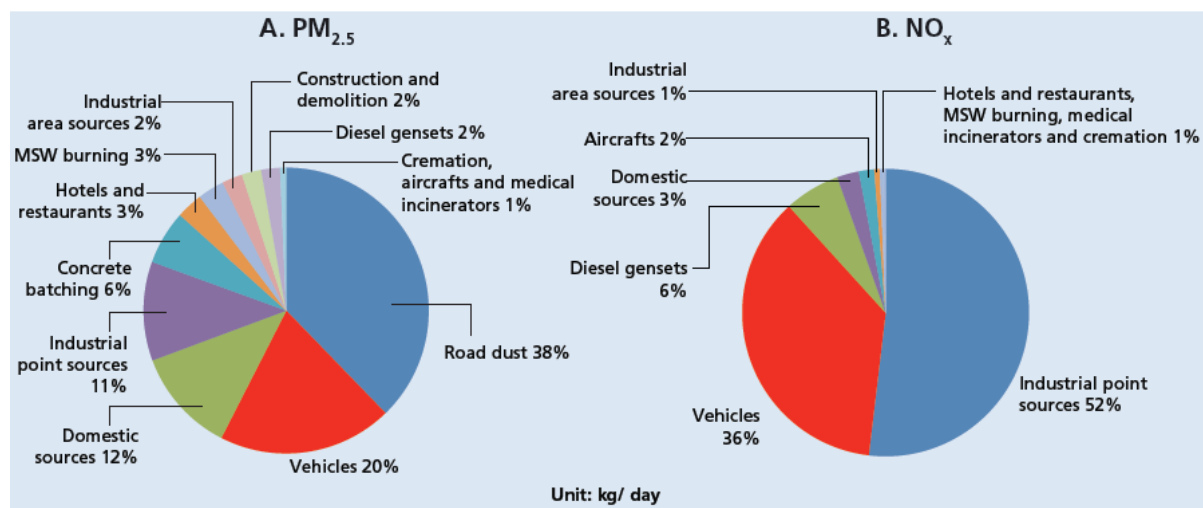
On the remaining measures under the CAP plan further deliberation are underway and it is expected that entire CAP directions will be notified by March 2018.

### 3. Sources of pollution

We know that there are **5 key sources of pollution**:

- Vehicles – grossly polluting vehicles like trucks and diesel vehicles as well as growing numbers that negates the impact of cleaner fuel and emission technology;
- Combustion in power plants and industries using dirty fuels, like pet coke, FO (and its variants), coal and biomass
- Garbage burning, both in landfills and other places where there is no collection, processing or disposal;
- Dust management on roads, construction sites etc, which adds to the particulate pollution.
- Crop residue burning because farmers do not have alternatives for use of straw.

**Graph 6: Emissions inventory - PM 2.5 and NO<sub>x</sub>**



Source: 2016, Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi, IIT Kanpur

#### **4. Vehicular pollution: Action taken**

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It is known that vehicles emit toxic fumes, which are particularly hazardous for humans. Vehicular emissions contribute to coating the dust particles, which are then responsible for impacts on our health. Actions that need to be taken are as follows;

- a. Advance emission technology and fuel quality for vehicles
- b. Improve pollution under control system for vehicles on road
- c. Build roads to divert truck traffic from entering the city and also put a congestion charge on trucks so that they look for alternatives
- d. Reduce the numbers of private vehicles on road by improving public transport and bring car restraint measures like parking

##### **4.1 BS 4: advanced implementation**

The Supreme Court on March 29, 2017 banned the sale of BS III vehicles in the country. The court ordered that from April 1, 2017 onwards only BS IV would be registered in the entire country.

##### **4.2 Advancement of BS 6: 2020**

The government of India has agreed to skip BS-V and leapfrog directly to BS-VI for all vehicles in April 2020. It has agreed to advance the proposed date for Euro-VI from 2026 to 2020. The Ministry of Road Transport and Highways has issued notification in this regard in September 2016. This is the first instance of such leapfrogging in the world.

It is also the first time in the world that BS-VI norms will be implemented for two- and three-wheelers. The BS-VI standard for these vehicles (small contributors individually but large because of the 17 million-odd that are sold in the country annually) introduces particulate standards and also separate standards for NO<sub>x</sub> and HC.

##### **4.3 Advancement of BS 6 fuel: April 2018**

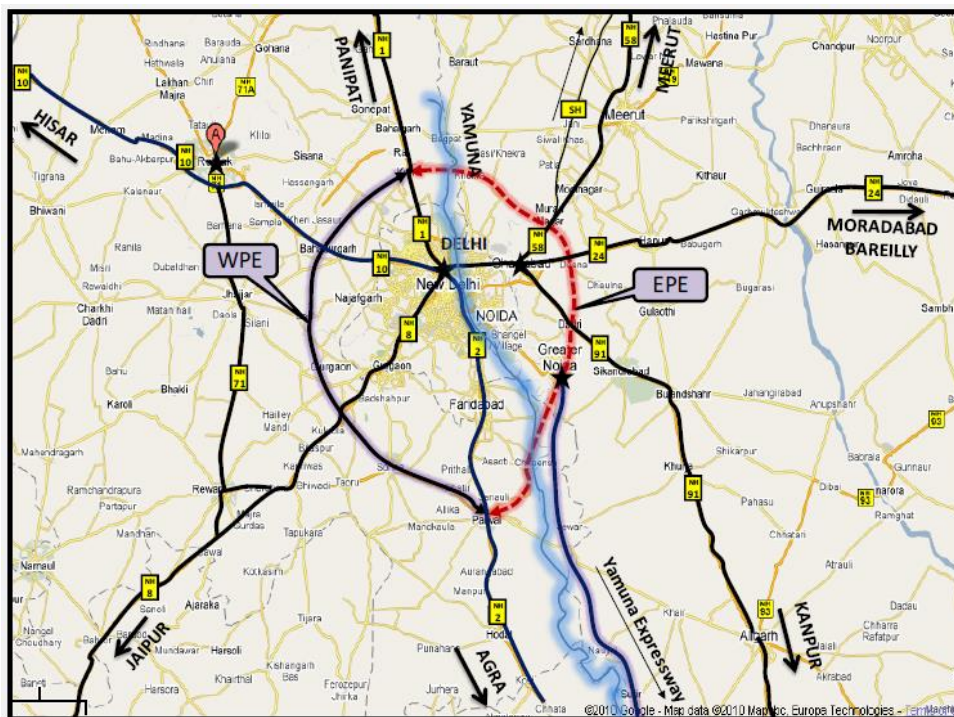
In what is a possible precursor to advancement of vehicle standards and definitely shows government's commitment to clean air, the Ministry of Petroleum and Natural Gas has stated that by April 2018, BS VI fuels (10 ppm sulphur diesel and petrol fuels) will be sold in Delhi two years ahead of the national schedule.

#### 4.4 PUC report and directions

EPCA has recommended several reforms including linking annual vehicle insurance with valid PUC certificates to improve compliance; linking PUC centres with central servers; increasing surveillance; periodic audit of PUC centres etc. On August 10, 2017, the Supreme Court directed implementation of these reforms and directed the government to assess and consider integration of on-board diagnostic system (OBD) with in-use emissions inspection programme for BS-IV vehicles. The key reform which will improve enforcement is the linking of PUC with insurance (see Annexure 1)

#### 4.5 Completion of WPE and EPE

The peripheral expressways around Delhi that will take away all the non-destined heavy-duty vehicles from Delhi i.e. Western and Eastern Peripheral Expressways will be completed by June 2018.



#### 4.6 Setting up of RFID at 13 locations for enforcement of ECC

The SDMC had floated a tender for the installation of RFID at the 13 toll plazas.

#### 4.7 Delhi Maintenance and Management of Parking Rules, 2017

Under the direction of the Lt Governor of Delhi, the Delhi Transport Department has set up a committee to frame the rules and guidelines for parking policy in Delhi called Delhi Maintenance and Management of Parking Rules, 2017.

#### **4.8 Vehicular pollution: Action to be taken 2018**

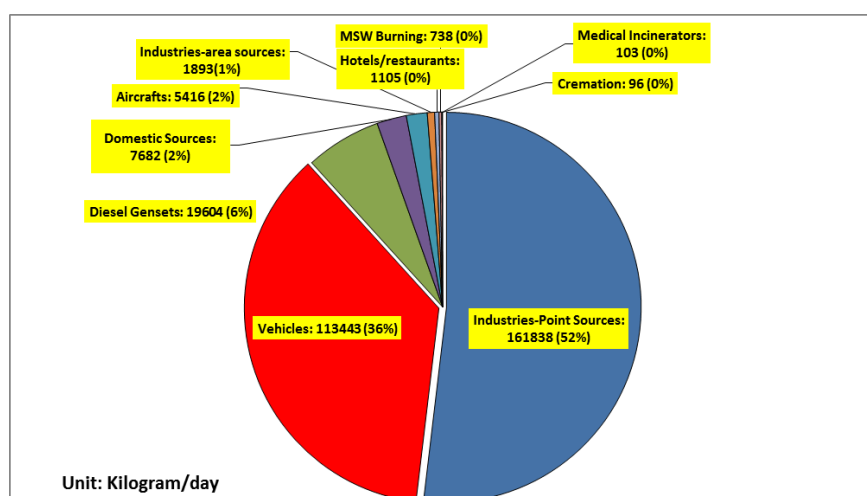
- a. Scale up electric vehicles production and sale
- b. Expansion of CNG
- c. Augmenting number of buses in Delhi
- d. NCR connectivity for public transport – need bus and Metro plans.
- e. Rationalize routes and augment public transport in NCR on CNG mode.
- f. Rationalize entry taxes in NCR under the NCR reciprocal agreement to lower costs of travel by public transport.
- g. Regional Rapid Transit System (RRTS) integrated with local transit systems should be implemented to provide seamless connectivity between regional and sub-regional centres of NCR.
- h. Integrated passenger terminals to be created with mixed use and multimodal facilities for passenger comfort, integrating regional and local public transit systems.
- i. Prepare and implement zonal plans for developing an NMT network

## 5. Action on industrial combustion

### Combustion from Industrial processes

Industrial emissions, both point and area sources account for much of the SO<sub>x</sub> and NO<sub>x</sub> emissions in Delhi-NCR (see graph). Industrial fuels that have high sulphur content, such as Petroleum Coke and Furnace Oil are major culprits for industrial emissions.

**Graph 7: Contribution of pollution sources to NO<sub>x</sub> load from all sources**



Source: Comprehensive study on Air Pollution and Green House Gases (GHGs) in Delhi (for Delhi Government) by IIT Kanpur, 2015

The strategy to clean up Industrial Air pollution includes the following:

- Cleaning up industrial fuels through mandating the use of Clean Fuels and making dirtier fuels inaccessible through fiscal and policy interventions
- Setting standards for SO<sub>x</sub> and NO<sub>x</sub> emissions for all industries
- Improving the enforcement of emission standards using Continuous Emission Monitoring Systems (CEMS)

### 5.1 Ban on Pet-coke and FO

The Supreme Court banned the use of Petroleum Coke (pet coke) and Furnace Oil (FO) for combustion in the states of Delhi, Haryana, Rajasthan and Uttar Pradesh on October 24, 2017. This was following EPCA reports on the subject to the Hon'ble Supreme Court dated December 2, 2016; April 4, 2017 (EPCA Report no. 72) November 9, 2017 (EPCA Report no. 76a) and EPCA report no. 79.

On November 15, 2017, the Central Pollution Control Board has issued directions under Section 5 of the Environmental Protection Act 1986 regarding prohibition on use of pet coke and furnace oil in NCR states.



## 5.2 Standards for NO<sub>x</sub> and SO<sub>x</sub> fixed

The Hon'ble Supreme Court directed the MoEF&CC and the CPCB on May 2, 2017 to fix and implement national SO<sub>x</sub> and NO<sub>x</sub> emission standards for 34 industries by December 31, 2017. This was following EPCA report no. 72 on such emission standards dated April 4, 2017

Subsequently, on January 29, 2018 the Ministry of Environment, Forests and Climate Change (MoEF&CC) has issued standards for 18 industry categories for control of NO<sub>x</sub> and SO<sub>x</sub> emissions. The Ministry is in the process of finalizing standards for 5 more industry categories, namely, limekiln, glass, ceramic, foundries, re-heating furnaces. As observed in the order of the Hon'ble Supreme Court of February 5, 2018, these standards will be finalized by March 31, 2018.

## 5.3 Directions for regulating sale, use of Pet-coke and FO

Furthermore, certain industry sectors, namely cement, limekiln and calcium carbide have been allowed the use of pet coke in their manufacturing process and the Hon'ble Supreme Court in its orders have directed for monthly reports to be compiled on the sale and use so as to ensure regulation.

As per the information EPCA have received from the state pollution control boards, most industries have switched from pet coke to coal and from furnace oil to LSHS (Low-sulphur heavy stock liquid fuel sold by refineries). Both coal and LSHS have high pollution potential and therefore, industries will have to install pollution control equipment to meet the emission standards that have been set through the notification of January 29, 2018. Meeting these standards will require industries to install equipment for NO<sub>x</sub> and SO<sub>x</sub> control. The other alternative is that industries can directly switch to using cleaner fuels, like natural gas or electricity (if available and cost-effective).

*In other words, the conditions have laid down for industry owners to take careful decisions on the technology and pollution control roadmap ahead– they have the option to install and run pollution control equipment or to switch to cleaner fuels, which may not require the installation of such equipment.*

EPCA will continue to review and monitor progress in this matter. The effective compliance of these directions will require effective enforcement. The MOEF&CC notification dated January 29, 2018 specifies that the “emissions from such industries need to be monitored and, all such industries would be required to install online monitoring system as per the online monitoring mechanism put in place by CPCB from time to time.” The state pollution control boards will have to ensure that these systems are put into place and that there is effective regulation on pollution.

#### **5.4 Ban on import of pet coke in India**

The Union of India in its December 2017 affidavit has stated that a ban on the import of Petroleum Coke is under consideration in view of the environmental hazards due to its use.

#### **5.5 Industrial Pollution: Actions pending 2018**

- a. Stringent implementation and enforcement of SO<sub>x</sub> and NO<sub>x</sub> emission standards using universal Continuous Emission Monitoring Systems (CEMS)
- b. Shift of industrial combustion activities to cleaner natural gas based systems instead of conventional industrial fuels

## **6. Action on thermal power plants**

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Thermal Power Plants are large area based sources of particulate as well as gaseous pollution, which affect the air quality of nearby urban and rural areas. Particularly, older power plants use outdated emission control technology that utilize dirtier coal with higher sulphur content, as well as operate at lower levels of efficiency.

The strategy to clean up air pollution from thermal power plants includes the following:

- a. Cleaning up fuels for thermal power plants through mandating the use of Clean Fuels and making dirtier fuels inaccessible through fiscal and policy interventions.
- b. Implementation of more stringent standards, first notified in 2015 for SO<sub>x</sub> and NO<sub>x</sub> emissions for all thermal power plants.
- c. Optimizing the use of existing power plants by prioritizing capacity utilization of natural gas/ clean fuel based thermal power plants, phasing out older coal based power plants and converting specific coal based power plants to natural gas.

### **Actions taken from 2017 onwards**

- a. Badarpur coal-based power plant will be permanently shut by July 2018.
- b. Bawana natural gas plant will start functioning fully (one unit of 600 mw) by March 1, 2018. The objective is to ensure that cleaner gas plants work in NCR and that coal plants are shut down.

EPCA has submitted a report to the Hon'ble Supreme Court dated February 14, 2018 recommending expedited implementation of the tighter emission standards for thermal power plants (TPPs), which was notified in 2015 and implemented within 2 years, that is, by 8.12.2017. This matter is ongoing and further orders are awaited.

## 7. Brick kilns

EPCA is working with state governments to move all brick kilns to use zig-zag technology which will substantially reduce pollution. Non-zigzag technology compliant brick kilns will be allowed to operate in NCR districts from March 1, 2018 to June 30, 2018 for one last season. These are brick kilns which have given affidavits to EPCA that they will convert to zig-zag technology by June 30, 2018.

The overall picture is as follows:

There are 1488 affidavits received from 19 districts of NCR

**Table 4: Number of affidavits filed by brick kiln owners to EPCA**

Rajasthan			Utter Pradesh			Haryana		
S. No.	District Name	Total No.	S. No.	District Name	Total No.	S. No.	District Name	Total No.
1	Alwar	74	1	Baghpat	173	1	Bhiwani	85
2	Bharatpur	87	2	Bulandshahr	196	2	Faridabad	75
			3	G.B. Nagar	46	3	Jhajjar	59
			4	Ghaziabad	68	4	Jind	36
			5	Hapur	88	5	Nur, Mewat	44
			6	Meerut	104	6	Palwal	77
			7	Muzaffar Nagar	171	7	Panipat	11
						8	Rewari	49
						9	Rohtak	39
						10	Sonipat	6
Total		161	Total		846	Total		481

EPCA is maintaining a list of brick kilns, which have converted to zigzag technology and are also compliant with the directions issued by CPCB. These brick kilns have been given permission to operate based on the verification by the state pollution control board, which have also provided EPCA with details of the GPS location of each compliant-brick kiln. As of July 1, 2018, only those brick kilns, which have been given permission and are listed in the converted zig-zag database will be allowed to operate.

As of February 2018, a total of 623 brick kilns have converted to zig-zag technology which is expected to bring a 70% reduction in emissions.

## 8. Paddy straw burning

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There is no question that large-scale burning of crop residues from paddy crop in October-November and then wheat in April in the neighbouring states of Punjab, Haryana and western Uttar Pradesh contributes significantly to the region's air pollution challenge. According to the 2015 IIT Kanpur Report on air pollution in Delhi, the overall contribution of biomass burning to particulate pollution during winter is fairly high—17 per cent for PM10 and 26 per cent for PM2.5. Emissions from crop residue burning contribute to this.

The reason why farmers burn crop residue are as follows:

- Mechanization of crops leads to smaller stubble left on the ground that is difficult to collect. This is combined with labour shortage and costs.
- In Punjab and Haryana, governments have notified that sowing of rice will be delayed to June because of concerns of groundwater depletion. This leaves the farmers with less time between the harvesting season of rice and sowing of wheat. Therefore, burning residue is the easiest option.
- Crop intensification leaves farmers with small windows to clear the fields and so burning the residue is the easiest.

**The Prime Minister's office had set up a Sub-Committee to recommend short and long-term solution to the problem of crop burning. EPCA has endorsed the report of this Sub-Committee, which has noted that the solution is to provide farmers with alternatives and to educate them that stubble burning is not in their best interest.** The view that farmers must stop stubble burning as they see benefits to improvement in soil health and crop productivity is important for long-term sustainability as well. Furthermore, it is clear that in-situ management – converting the straw into mulch – is the most environmentally sound option.

**The sub-committee has elaborated a strategy to provide easy subsidy at 50-75% so that machineries used for tilling the residue back into the soil are easily available to farmers.** It is also important that the sub-committee has decided *against* providing Rs 100 additional in the MSP given to farmers for not burning stubble. This would have become a perverse incentive and should be avoided. The Sub-Committee's suggestion that the Agricultural Costs and Prices Commission can look into providing additional funds for better crop management is a good approach.

Budget 2018, has allocated Rs 1200 crore for this programme. MOEF&CC has been nominated the nodal agency for the implementation of the programme.

It is urgent that this work is taken by expeditiously and timelines in the report are followed.

## 9. Priority work to be done 2018

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It is important not to lose the momentum for clean air.

It is also important to realize that even with all this attention and work done, we have only improved air quality marginally and that levels remain at poor-very poor category. This is hazardous for health.

**We say this because current levels of air pollution are unacceptable and are a serious health issue. The damage to human health because of toxins in air must not be under-estimated.** A recent study done in Delhi shows Indian children growing with smaller lungs. Both boys and girls have lungs that are about 10 per cent smaller when they become adults in India. Other studies confirm extensive impact on health. Global burden of disease (GBD) February 2017 of more than total global 4.2 million early deaths -- 1.1 million deaths occur in India alone. This is more than a quarter of the global deaths. While early deaths related to PM2.5 in China have increased by 17.22 % since 1990, in India these have increased by 48%.

**We need the following actions, at scale and speed;**

- a. Massive augmentation of public transport so that people do not have to use their cars.
- b. Massive move towards cleaner fuels like natural gas or electricity generated from cleaner sources, including renewables.
- c. Massive efforts to enforce and implement directions for not burning of garbage and dust management. Currently, we do not segregate waste at the household level and this is adding to the crisis of waste burning in the country.
- d. Massive efforts to subsidise farmer's technologies that will allow them to re-plough the straw into the ground.

**Key work to be done: March 2018 and onwards**

	Work to be done	Agencies
1.	Complete setting up network of monitoring stations and link all	State pollution boards/CPCB
2.	Ensure that all actions are continuously taken as listed in GRAP for moderate to poor category	All state governments with regular monitoring by chief secretaries
3.	Notify the Comprehensive Action Plan	MOEF&CC
4.	Implement the Comprehensive Action Plan through regular monitoring and	MOEF&CC

	enforcement	
5.	Implement the directions of the Hon'ble Supreme Court of August 10, 2017 and February 5, 2018 on PUC	MORTH and state transport departments
6.	Ensure that trucks move to completed and commissioned EPE/WPE and that orders of Hon'ble Supreme Court on diversion of non-destined trucks and ECC are strictly adhered to.	State governments
7.	Ensure RFID is installed as per the directions of the Hon'ble Supreme Court by onset of winter 2018	SDMC
8.	Implement actions on public transport, non-motorised transport and car restraint as listed and agreed upon with timelines in CAP	MOEF&CC to ensure implementation
9.	Enforce directions of Hon'ble Supreme Court on pet coke/FO ban and implement standards for SOX and NOx in all industries and facilitate shift to cleaner fuel	State pollution control boards
10.	Ensure that all industries are equipped with online monitoring, which is made available publicly	State pollution control boards
11.	Ensure that there is strict regulation/ban on polluting industries operating from non-conforming areas	EPCA is working on report on this and will discuss with all stakeholders on how to proceed
12.	Expediting emission standards for thermal power plants	Hon'ble Court to give directions
13.	Ensure operation of gas based Bawana (unit 1) from March 1, 2018 and closure of coal based Dadri power plant in winter 2018	Delhi Power Department
14.	Implement the recommendations of the High Level Task Force on crop burning	MOEF&CC is the designated nodal agency

## Annexure 1

Table: Directions of the Hon'ble Supreme Court dated August 10, 2017

S. No.	Recommendations of EPCA	Response of the Ministry	Direction
1.	Limit the number of PUC centres, upgrade them and bring them under strong supervision and quality control.	<p>(i) There are two approaches on the subject: (i) that the number of PUC Centres should be curtailed and those which are allowed to remain in operation are high quality centres; (ii) that the number of PUC Centres should be enlarged across all possible points of regular contact points of a vehicle owner. There is a case for working on both the approaches.</p> <p>(ii) Accordingly, it is proposed to request the Society for Indian Automotive Manufacturers (SIAM) to explore the feasibility of provision for high-end PUC centers at all the authorized service centres of OEMs. These Service Centres can then be required to furnish a PUC Certificate at the time of servicing a vehicle. Ensuring that the serviced vehicle is compliant with the norms should form a part of the vehicle service norms.</p> <p>(iii) An advisory is also proposed to be issued to the State Transport Departments for mandating PUC centres at each fuel station.</p> <p>(iv) List of all Type Approved PUC Machines by various test agencies would be put on</p>	<p>(i) ****</p> <p>(ii) The learned Solicitor General will ascertain the number of petrol stations in the NCR region and how many of them are equipped with PUC centres. The learned Solicitor General will also ascertain how many authorized service centres of OEMs are in the NCR region.</p>



		MoRTH website.	<p>(iii) The learned Solicitor General says that an advisory will be issued to all the State Transport Departments all over the country for mandating PUC centres at every fuel station.</p> <p>(iv) The learned Solicitor General says that all empanelled and authorized PUC Centres having Type Approved Machines will be uploaded on the website of the Ministry of Road, Transport and Highways with their names, addresses and authorized personnel. In the first stage, the needful will be done within a month in so far as the NCR region is concerned and thereafter for the rest of the country.</p>
2.1	Ensure 100 percent compliance by linking annual vehicle insurance with PUC certificates.	While linkage of renewal of Insurance with PUC certificates may be desirable, it may be noted that the vehicle insurance renewal is an annual feature whereas the periodicity for PUC norms for any vehicle should be at shorter intervals. It has been observed with serious concern	There is now no dispute or disagreement about this. However, it is made clear that the Insurance Companies will not insure a vehicle unless it has a valid

		that the coverage of third party insurance for motor vehicles is very low at this stage. Linkage of PUC certificate with Insurance may be counter-productive to that extent. MoRTH is of the view that with the linkage of PUC Centres with VAHAN database and other enforcement measures, the PUC compliance by motor vehicle owners is likely to improve considerably.	PUC certificate on the date of renewal of the insurance policy. This should be implemented at the earliest.
2.2	Introduce automatic online network for transmission of PUC data to the central server to minimize manual interference and allow proper analysis of data for remote auditing of PUC centres.	It has been planned to link all the PUC Centres with the VAHAN database, starting 01.04.2018, in a phased manner, for transmission of PUC data on real time basis. MoRTH proposes to bring necessary amendments in Rule 115 of Central Motor Vehicles Rules, 1989 to ensure compliance by PUC centres. The data linkage of PUCs with Vahan database is expected to bring on board all the compliant and non-compliant test results. As a matter of fact, the exercise is intended to lead to corrective measures rather than punitive in the first instance. For instance, if a vehicle is found to be failing in the emission norms, the vehicle owner should be allowed a week's time to get his vehicle serviced so as to become compliant. If the vehicle owner still does not take curative measures, he should be subjected to punitive measures.	There is no objection to this. The learned Solicitor General says that he will ensure that this is implemented throughout the country and efforts will be made to update VAHAN database on a regular basis.
2.3	Mandate pre-payment of PUC fees before the tests are	Accepted. Payment receipts can be generated while feeding the registration details before the actual test. This would ensure	There is no objection to this and it should be implemented at the earliest.

	conducted	pre-payment for the test and capture all cases compliant with emission norms or failing the same.	
2.4	Strengthen inspection of the PUC centres for quality control and strengthen the licensing programme.	MoRTH would issue advisory to the States to the effect that the Calibration of PUC machines should be done at regular periodicity by third party agencies duly authorised by the Transport Department of the state. Further, the Transport Departments shall also be advised to carry random checks of the PUC centers and also to carry enforcement drive for PUC compliance by Motor Vehicle Owners.	There is no objection to this and it should be implemented at the earliest.
2.5	Phase in big centralized emissions testing centres capable of conducting automatic and upgraded tests for commercial vehicles on a priority basis.	The Motor Vehicle Amendment Bill, 2017 proposes that the fitness of all transport vehicles after 1st of October 2019 shall be granted after testing through an automated testing station authorized by the State Government.	This will be considered on a later occasion.
2.6	Introduce well-equipped mobile test centres and a programme to check visibly polluting vehicles.	States would be requested to take necessary action in this behalf, being the enforcement agencies within their respective jurisdictions.	There is no objection to this and it should be implemented at the earliest.
2.7	Enforce stringent penalty for PUC centres for non-compliance and malpractices.	States would be requested to cancel the authorization of non-compliant PUC Centres.	There is no objection to this and it should be implemented at the earliest.
3.1	(i) Tighten the PUC emissions norms for pre-Bharat Stage IV vehicles	(i) The vehicles are manufactured to comply with a predefined emission standard. It is not possible for vehicle owners to improve the emission levels at	This will be considered on a later occasion.

	(ii) Overall emissions tests and tighten norms for diesel vehicles.	a later stage. Bharat Stage IV vehicles are already mandated to meet stringent emission norms.  (ii) Strengthening of PUC certification process is expected to ensure better compliance.	
3.3	Make Lambda test for petrol cars mandatory across NCR	All 2 gas analyser in the field would be upgraded to 4 gas analyser by the concerned manufacturer by 1st October 2018 to enable lambda measurement of petrol vehicles. Necessary amendment in the Central Motor Vehicles Rules, 1989 would be initiated by the Ministry	There is no objection to this and it should be implemented at the earliest.
3.4	Integrate On Board Diagnostics (OBD) with inspection and maintenance programme	Present PUC test procedure as per Rule 115 of Central Motor Vehicles Rules, 1989 specifies verification of a malfunction indication lamp (MIL) of OBD before carrying out PUC test. If MIL is 'ON' i.e. there is engine/ emission system fault, then the vehicle owner is required to get the vehicle serviced at the service centre for rectification of the fault. A detailed analysis of the OBD fault will be carried out using scanning tool at the service centre.	Learned Amicus says that EPCA would like to reconsider this.
3.5	Detail out the strategy for advanced real driving emissions monitoring of new generation vehicles to come with BSVI emissions standards in 2020	Real driving emission measurements is a detailed and comprehensive emission measurement process and is slated for implementation along with BS VI norms from 2020 at the time of new model type approval. Further, verification of real driving performance of vehicles at the time of conformity	This will be considered on a later occasion.

		of production test will be carried out.	
Others	Implement emissions recall programme to make vehicle manufacturers responsible for manufacturing defects and introduce regulations to prevent use of cheat and defeat devices to reduce emissions on road.	The Motor Vehicle Amendment Bill, 2017 proposes a provision for recall of vehicles. Hence, if a defect is observed in any on-road vehicle which may cause harm to the environment, manufacturer would be directed to recall the vehicles.	There is no objection to this and it should be implemented at the earliest.