



ACTION PLAN FOR CONTROL OF AIR POLLUTION IN NON-ATTAINMENT CITY OF CHANDIGARH

ACTION PLAN FOR CONTROL OF AIR POLLUTION IN CHANDIGARH

Chandigarh is a well planned city known all over the world for its architecture planning and landscape. Geographical area of U.T., Chandigarh is 114 Sq.Kms. of which approx. 40.5% is Forest Area. The City was named after the mother goddess of power, *Chandi*, whose temple Chandimandir is located in the vicinity of the site selected for the city. The population of the city is approx. 12 lakhs and the number of vehicles including the floating vehicles is approx. 11.00 lakhs. The rapid increase in population and vehicles have led increase in pollution levels and thus posed a challenge.



Air pollutants are added in the atmosphere from variety of sources that change the composition of air and affect the biotic environment. The concentration of air pollutants depend not only on the quantities that are emitted from air pollution

sources but also on the ability of the atmosphere to either absorb or disperse these emission. The pollution concentration vary spatially and temporarily causing the air pollution pattern to change with different locations and time due to changes in meteorological and topographical condition. The sources of air pollutants include vehicles, industries, domestic and natural sources. The presence of air pollutants in the ambient air adversely affects the health of the population. In order to prevent and control air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981. The responsibility has been further emphasized under Environment (Protection) Act, 1986. It is necessary to assess the present and anticipated air pollution through air quality survey/monitoring programs. Therefore, Central Pollution Control Board had started National Ambient Air Quality Monitoring (NAAQM) Network during 1984 - 85 at national level and gradually the number of stations has increased over the years. The programme was later renamed as National Air Quality Monitoring Programme (NAMP).

Chandigarh is land locked Union Territory in which there is no possibility of expansion and obviously there is no possibility of road length expansion. Studies have shown that the air quality in Chandigarh is mostly affected by the vehicular pollution of the city. The fleet of vehicles is over 2 per capita household. Chandigarh has the highest density of vehicles in India. The major contributor of air pollution in Chandigarh are as follows:-

1. Vehicular Density
2. Roadside Dust
3. burning of dry leaves
4. Litter from trees & gardens in the city
5. Operation of generator sets in certain areas adjoining the city
6. Stubble burning in specific seasons of the year in neighbouring areas of Chandigarh.

Air Quality Monitoring Committee (AQMC)

As per the orders of Hon'ble National Green Tribunal (NGT) in the matter of news item published in 'The Times of India' authored by Shri. Vishwa Mohan titled **"NCAP with Multiple Timelines to Clear Air in 102 Cities to be**

released around August 15” Air Quality Monitoring Committee (AQMC) has been constituting in Chandigarh comprised of the following members:-

1. The Director Environment, Chandigarh
2. The Commissioner, Municipal Corporation, Chandigarh
3. The Director Industries, Chandigarh
4. The Director Transport, Chandigarh
5. The Chief Architect, Department of Urban Planning, U.T. Chandigarh
6. The Member Secretary, Chandigarh Pollution Control Committee, Chandigarh

AQMC held its meetings on 13.11.2018 and on 11.12.2018 and discussed the matter in detail. The time targets has been given to various departments for the execution of Actions proposed to control of air pollution in Chandigarh so that improvement can be seen in the air quality in near future.

1. Name of the city : **CHANDIGARH**
2. Air Pollution concern : **PM₁₀ & PM_{2.5}**
3. Air pollution levels: Range of 24-hourly average concentration values of PM₁₀, SO₂ & NO_x for the period 2012 to 2018 and PM_{2.5} for the period 2015 & 2018 are given in the later part of this report.
4. Months with high air pollution levels: **November, December, January**
5. Action plan:

ACTION PLAN FOR CHANDIGARH BEING A NON ATTAINMENT CITY

Source group	Action	Implementation period (short/mid/long-term)	Time target for implementation	Responsible agency(ies)	Any other information	Financial implications (if any)
1	2	3	4	5	6	7
Vehicles	Launch extensive drive against polluting vehicles for ensuring strict compliance.	Short Term	Continuing activity	State Transport Authority(STA)/Traffic Police	State Transport Authority of Chandigarh Administration conducts public awareness camps with the help of Chandigarh Police from time to time. Chandigarh Traffic Police is taking strict action against polluting vehicles in the city. During this year upto 18.11.2018, 392 vehicles have been challaned for the violation of without PUC and 4009 notices under sub-section (1) of section 116 of Central Motor Vehicles Rules, 1989 have been issued for the said violation. Chandigarh Traffic Police is running a special campaign titled "Make Chandigarh Honk Free" w.e.f. 01.01.2018 which is a year long campaign. The objective of which is to make Chandigarh not just look but sound beautiful too.	NIL
	Launch Public awareness campaign for air pollution control, vehicle maintenance, minimizing use of personal vehicle, lane discipline, etc.			State Transport Authority(STA) & Traffic Police	Chandigarh Traffic Police has informed that public awareness campaigns are regularly conducted by the Children Traffic Park (CTP). During the year upto 31.08.2016 more than 56,220 members of targeted groups (educations, villagers etc.) have been educated on road safety pamphlets/literatures have been distributed. Chandigarh Traffic Police too is regularly imparting road safety education to the general public to make them aware about road safety rules and regulation.	NIL
	Prevent parking of vehicles in the non-designated areas.			Urban local bodies & Police Dept.	Chandigarh Traffic Police, Chandigarh has informed that parking of vehicles in the non designated area is also enforced by towing vehicles and locking of wheels by wheel lock clamps. During the year upto 28.11.2018, 33781 vehicles have been challaned for	NIL

					the violation of wrong parking.	
	Initiate steps for retrofitting of particulate filters in diesel vehicles, when BS-V fuels are available.	Mid Term	--	State Transport Authority(STA) and Traffic Police	State Level Coordinator (Oil Industry) has informed that As per Government of India guidelines, India is going to skip adopting BS-5 norms and progress directly to adopting BS-6 norms by 2020. The steps for retrofitting of particulate filters in diesel vehicles is to be undertaken by Automotive industry under directions from Government of India as and when BS-VI fuels are available. (There is no Automobile Manufacturing Industry in Chandigarh)	NIL
	Prepare action plan to check fuel adulteration and random monitoring of fuel quality data.	Short Term	Continuing Activity	Representative of Petroleum product distributor companies	State level Coordinator (Oil Industry), U.T. Chandigarh has informed that they are conducting random/surprise inspections of retail outlets situated in U.T. Chandigarh to check fuel adulteration and monitoring of fuel quality through Mobile Lab as well as by team of Officers.	NIL
	Prepare plan for widening of road and improvement of infrastructure for decongestion of road.	Short Term	6 Months	Urban Planning Department & Engineering Department	According with the recommendations of CMP-2031 Dept. of Urban Planning has issued planning for Non Motorised Vehicle (NMV) infrastructure along Vikas Marg a major arterial road in the city and for many other junction improvements for smooth crossings of pedestrian and cyclists. Further, planning for cycle tracks, footpaths along other major arterial is under progress. As per the Chief Engineer, Chandigarh Admn. the work of widening of existing road from Junction 63 to UT boundary shall be taken up shortly. 136 Kms. of Cycle tracks and footpaths have been constructed out of total 180 Kms. to segregate the non motorized vehicles from main traffic flow.	NIL
	Prepare plan for construction of expressways/bypass to avoid congestion due to non-destined vehicles.	Long Term	The time target is proposed only after the land acquisition process.	Chandigarh Administration/Engineering Department	Engineering Department and Urban Planning Department U.T. Chandigarh has informed that the outer road i.e. Purav Marg & Vikas Marg within the city area already functioning the purpose of bypasses to non-destined vehicles. Dept. of Urban Planning, Chandigarh has already sent the letter to Transport Department, Chandigarh Administration to include following agendas in the next Road Safety Council Meeting:	NIL

					<ul style="list-style-type: none"> • Shared Mobility Concept and Staggered office hours as per CMP-2031. • Separate Lane for Ambulance along V-2 roads. <p>As per the Engineering Department, Chandigarh Admn. the construction of new PR4 and PR5 roads connecting Dakshin Marg and Vikas Marg with the Punjab boundary towards Mullanpur side has been proposed and will be executed after completion of land acquisition process.</p>	
	Synchronise traffic movements /introduce intelligent traffic systems for lane-driving.	Mid Term		Traffic Police	To mitigate traffic congestion in the city, Chandigarh Traffic Police has recommended synchronization of traffic lights from Fun Republic Light point to Transport Light Point as well as synchronisation of traffic lights from Fun Republic Light Point to PGI Chowk on Madhya Marg to the Engineering Department, Chandigarh vide letter no. D-1684, dated 13.12.2017 and D-09, dated 04.01.2018. Further the matter is also taken up under the Smart City Project.	NIL
	Steps for promoting battery operated vehicles.	Mid Term	Continuing Activity	Science & Technology Department	Chandigarh Administration has already taken several steps to promote battery operated vehicles in Chandigarh. Chandigarh has already exempted the battery operated vehicles from VAT fully vide notification dated 27th January 2016 and also exempted on battery operated vehicles from road tax vide notifications January 2017. They have informed that E-rickshaw policy has already been notified by Chandigarh Administration and regarding subsidy for battery operated vehicles, since Ministry of Heavy Industries, GOI has launched the national Electric Mobility Mission Plan, 2020 under which they have announced a scheme for faster adoption and manufacturing of electric vehicles under capital subsidy to maximum capital of Rs. 1.24 Lakh per vehicle provided by GOI.	NIL
	Inspection /maintenance to all BSII & BS III	Mid Term	Continuing Activity	State Transport Authority (STA) & Traffic Police	As per State Transport Authority, Chandigarh Administration, every commercial vehicle is checked and provided fitness certificate on yearly	NIL

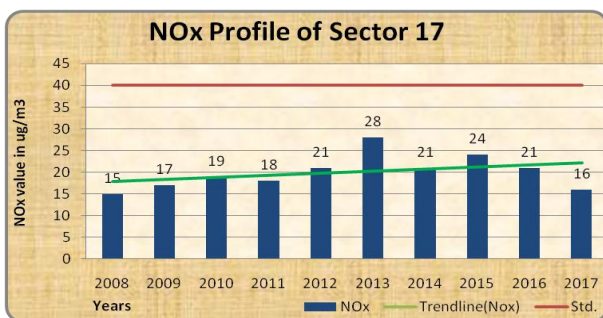
	commercial vehicles				basis by the Dept.	
	Pick and Drop facility to school children and teachers especially for govt. schools.	Mid Term	Continuing Activity	Chandigarh Transport Undertaken (CTU)	CTU is already operating 20 Nos. of buses within Chandigarh providing 40 trips (up/down) for school students and teachers.	NIL
	Ban on entry of more than 15 years old commercial vehicles in Chandigarh	Mid Term	Already done	State Transport Authority	Chandigarh has already ban the 15 years old commercial vehicles in Chandigarh.	NIL
Road Dust	Preparation plan for green buffers along the traffic corridors.	Short Term	March 2019	Chandigarh Administration	The trees are being planted every year on the Municipal Land along the road. There is a target of plantation 5508 trees in the year 2018-19. Till date 5100 trees have been planted on the roads under the jurisdiction of Municipal Corporation Chandigarh. Rest of the trees will be planted in the month of Feb 2019.	NIL
	Maintain potholes free roads for free flow of traffic	Mid Term	Continuing Activity	Engineering Department	Engineering Department, U.T. Chandigarh has informed that presently the V-1, V-2 and V-3 roads and national Highways within the jurisdiction of Chandigarh Administration are being maintained regularly as per requirement. Also routine maintenance of roads being done by Municipal Corporation Chandigarh from time to time.	NIL
	Greening of open areas, gardens, community places, schools and housing societies	Mid Term	3 Years	Municipal Corporation Chandigarh & Horticulture Department	This is under the jurisdiction of Horticulture Department and Municipal Corporation, Chandigarh & Horticulture department has informed that they are maintaining the open area gardens/schools under their jurisdiction which are provided with green grass. Accordingly, Municipal Corporation, Chandigarh has informed that they are maintaining about 1800 Nos. small and big gardens/green belts and Neighborhood Parks which are provided with green grass. The lawn area of Community Centres and Primary Schools under the jurisdiction of them is provided with green grass. The remaining area will be developed as green area within 3 years.	NIL

	Blacktopping metaled road including pavement of road shoulders.	Mid Term	Continuing Activity	Engineering Department/Municipal Corporation Chandigarh	All the roads under the jurisdiction of Municipal Corporation Chandigarh are carpeted with bituminous material.	NIL
	Road design improvement	Short term	Continuing Activity	Urban Planning Department & Engineering Department	The road design improvement like provision of slip roads, provision of ATC signals, Road Signage, Road Marking, Road Furniture etc. being carried out regularly as per requirement.	
	Introduce water fountain at major traffic intersection wherever feasible with the use of tertiary treated water.	Mid Term	Continuing Activity	Engineering Department	Municipal Corporation Chandigarh has informed that they have installed few water sprinkling systems along the roads at Sector 31.	NIL
Biomass and garbage burning	Launch extensive drive against open burning of bio-mass, crop residue, garbage, leaves, etc.	Short Term	Continuing Activity	Municipal Corporation Chandigarh	Municipal Corporation, Chandigarh has informed that they issue office order from time to time through sanitary Inspection/Head Quarter that no garbage and dry leaves are burnt in open under any circumstances. The Sanitary Inspectors are further ordered to conduct the IEC activities to educate Safai Karamchari/ Residence as to ill effects of burning and penalty under Air Prevention Act.	NIL
	Regular check and control of burning of municipal solid waste.				Municipal Corporation has informed that special task force for regular checking and control of burning of municipal solid waste will be constituted. It will be managed from the available existing infrastructure. Conducting special IEC activities and special drives.	Rs. 3 Lacs
	Proper collection of horticulture waste (bio-mass) and its disposal following composting-cum-gardening.				Municipal Corporation, Chandigarh has informed that the horticulture waste collected from road berms will be handed over to Horticulture Division for preparing compost etc. Extra vehicles will be hired as per necessity during autumn season.	Rs. 30 Lacs/annum
	Construction of advanced waste management Site.	Mid Term	18 Months	Municipal Corporation Chandigarh	The Municipal Corporation Chandigarh is planning to set up Material Recovery Facility (MRF) in approximately total 3 acres out of which 1 acre will be utilized for construction of building and remaining 2 acres will be provided with CC flooring	Rs. 9 Crores + Rs. 25 Crores

					for incoming and outgoing of vehicles. The Municipal Corporation Chandigarh is planning to construct 5 Nos. transfer station of 1 acre each for collection of municipal solid waste for subsequent transfer to dumping ground with the help of compactors.	
Industries	Action against non-complying industrial unites	Short Term	Continuing Activity	Chandigarh Pollution Control Committee (CPCC)	Chandigarh Pollution Control Committee, Chandigarh take Immediate action against all the non-complying units.	NIL
	Promoting cleaner production in industries.	Mid Term	1 Year	CPCC & Department of Industries	Industries will be given directions to shift to more cleaner fuels to reduce the emissions levels.	NIL
	Fugitive emission control	Short Term	Continuing activity	CPCC	Industries emitting fugitive particles are only allowed to run if they are having proper APCD.	NIL
Construction and Demolition activities	Enforcement of Construction and Demolition Waste Rules	Short Term	March 2019	Municipal Corporation Chandigarh (MCC)	The land for setting up of Construction & Demolition Waste plant and bulk disposal site has been identified in Industrial Area, Phase-I and work of setting up plant is under construction and will be completed by 31.03.2019. Complete processing, sprinkling, screening and recycling plant to construct concrete products from the waste is also incorporated in this plant.	Rs. 2.50 Crores
	Control measures for fugitive emissions from material handling-conveying and screening operations through water sprinkling, curtains, barriers and dust suppression units.					
	Ensure Carriage of construction material in closed / covered vessels.					
Other Steps	Air Quality Index to be calculated and disseminated to the people through	Mid Term	Dec 2019	CPCC	Air Quality index is already being published on the display board installed at six locations in Chandigarh. CPCC is already in process to purchase real time	NIL

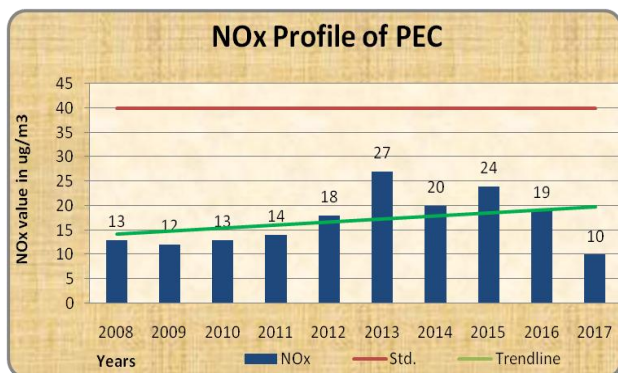
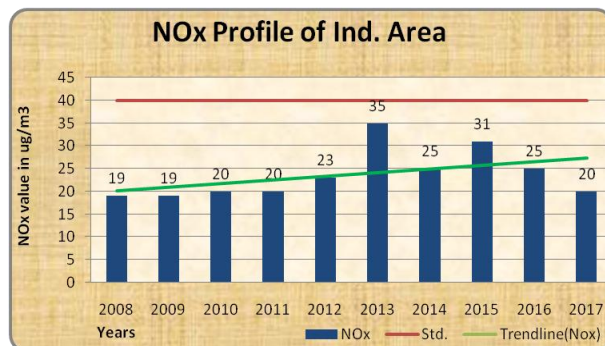
	website and other media.				monitoring instrument, data of which will be published on real time basis.	
	Engage with concerned authorities on continual basis for maximizing coverage of LPG /PNG for domestic and commercial cooking with target of 100% coverage.	Mid Term	Continuing Activity	Food & Supply Department	<p>State Level Coordinator (Oil Industry) has informed that PNG supply network is being laid in Sector 48,49,50 & 51 through DRS installed at Sector 49 network is available to cater about 12000 DU's (Dwelling Units) out of which 1350 DU's have registered for PNG.</p> <p>Another DRS is installed at Dhanas, with a network laid for about 4000 DU's and being further expanded to cater to 10000 DU's out of which 95 DU's have registered for PNG.</p>	NIL
	Monitoring of DG sets and action against violations.	Short Term	Continuing activity	CPCC	As D.G. set upto 1000 KVA is out of consent purview as per directions of CPCB, monitoring is being done intermittently or after receiving any complaint suitable action is taken accordingly by CPCC.	NIL

Profile of NO_x in Chandigarh



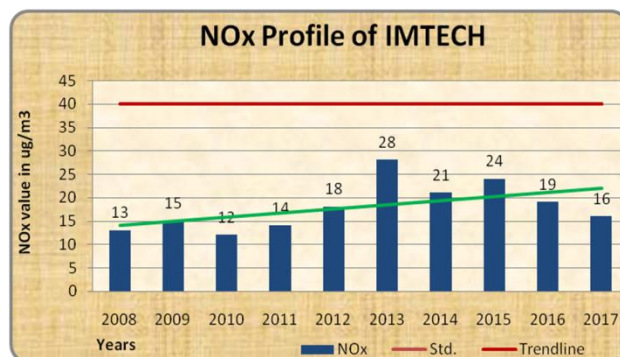
- Sampler installed at Commercial Market
- NO_x value ranges from 15 to 28 $\mu\text{g}/\text{m}^3$
- Values are well below the standard of 40 $\mu\text{g}/\text{m}^3$ but linear Trendline shows that actually there was continual increase in concentration earlier but it is decreasing now.

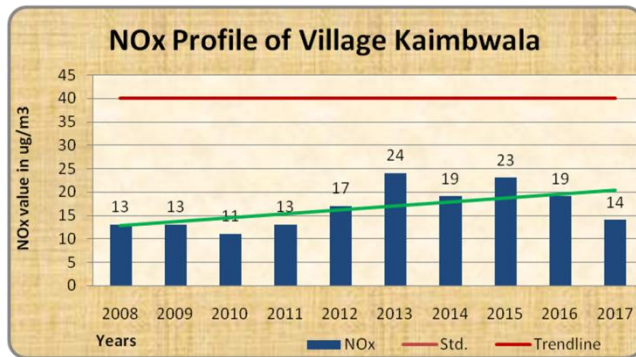
- Sampler installed at Ind. Area Ph-I of Chandigarh
- NO_x value ranges from 19 to 35 $\mu\text{g}/\text{m}^3$
- Values are well below the standard of 40 $\mu\text{g}/\text{m}^3$ but linear Trendline shows that actually there was continual increase in concentration earlier but it is decreasing now.



- Sampler installed at Punjab Engg. College, Chandigarh
- NO_x value ranges from 10 to 27 $\mu\text{g}/\text{m}^3$
- Values are well below the standard of 40 $\mu\text{g}/\text{m}^3$ but linear Trendline shows that actually there was continual increase in concentration but it is decreasing now.

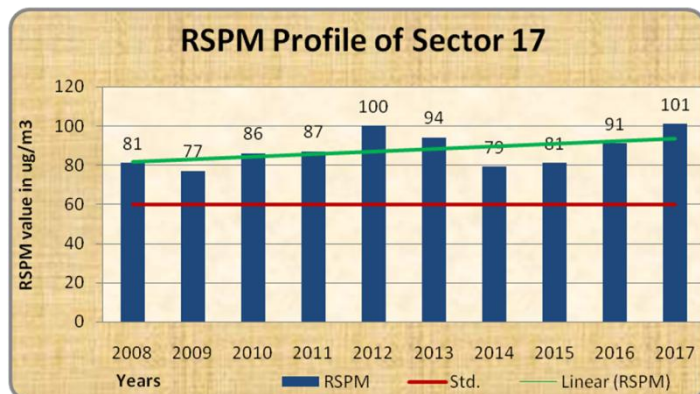
- Sampler installed at Institute of Microbial Technology, Chandigarh
- NO_x value ranges from 12 to 28 $\mu\text{g}/\text{m}^3$
- Values are well below the standard of 40 $\mu\text{g}/\text{m}^3$ but linear Trendline shows that actually there was continual increase in concentration but it is decreasing now.





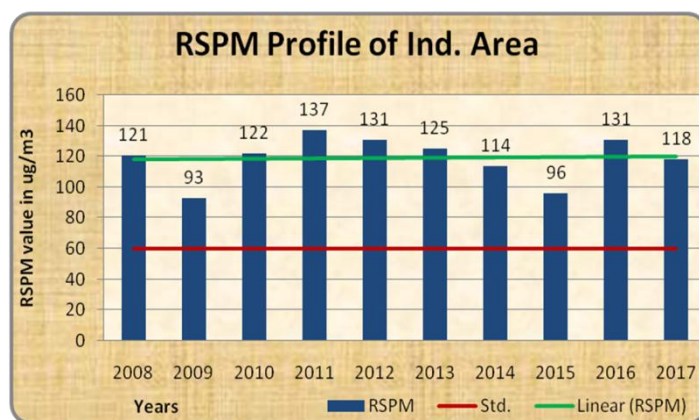
- Sampler installed at Village Kaimbwala
- NOx value ranges from 11 to 24 $\mu\text{g}/\text{m}^3$
- Values are well below the standard of 40 $\mu\text{g}/\text{m}^3$ but linear Trendline shows that actually there was continual increase in concentration but it is decreasing now.

RSPM Profile of Chandigarh

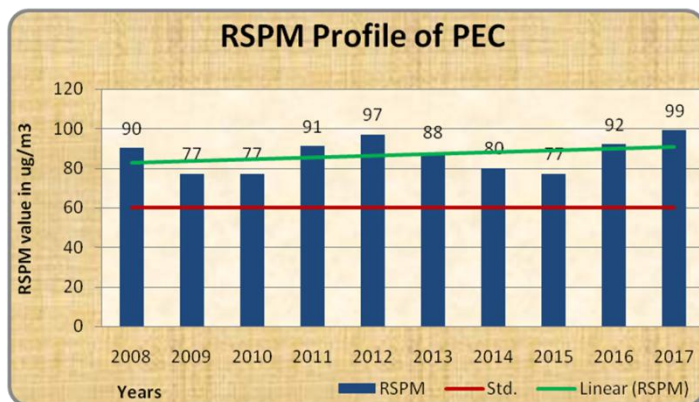


- Sampler installed at Commercial Market
- RSPM value ranges from 77 to 101 $\mu\text{g}/\text{m}^3$
- Linear Trendline shows that there is slight increase in concentration

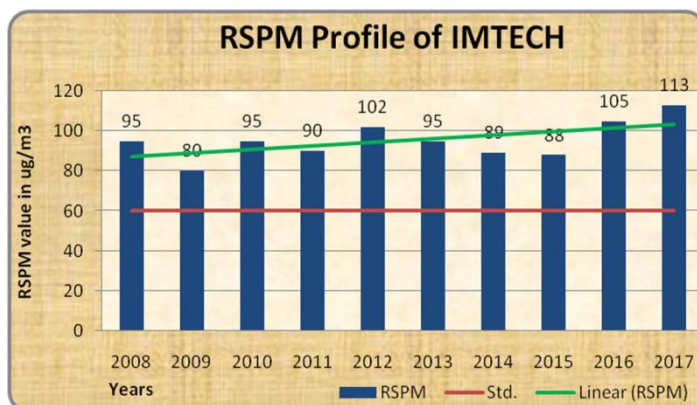
- Sampler installed at Industrial Area
- RSPM value ranges from 93 to 137 $\mu\text{g}/\text{m}^3$
- Linear Trendline shows that actually there is no noticeable difference in concentration

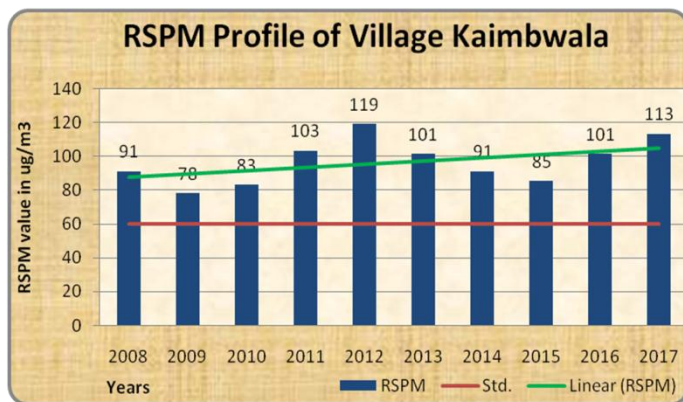


- Sampler installed at Punjab Engineering College Campus
- RSPM value ranges from 77 to 99 $\mu\text{g}/\text{m}^3$
- Linear Trendline shows that actually there is slight increase in concentration



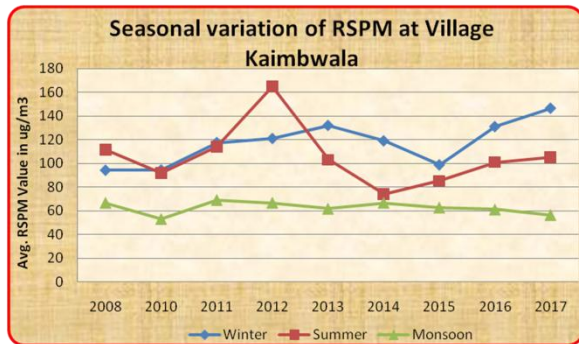
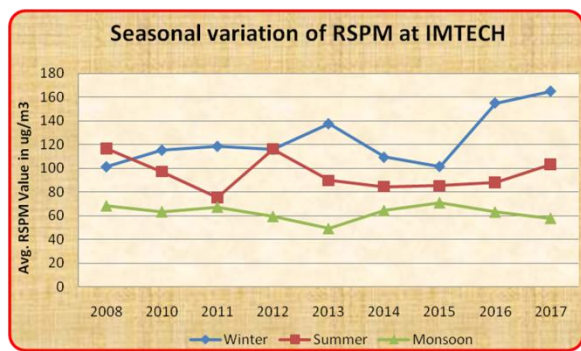
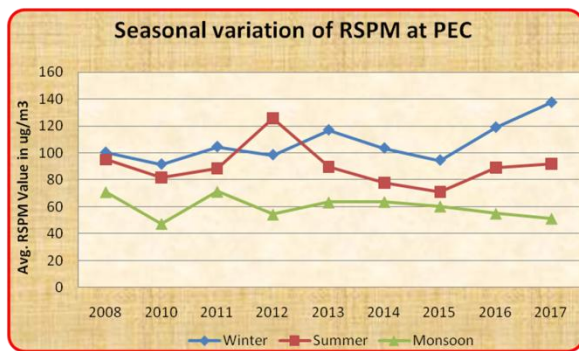
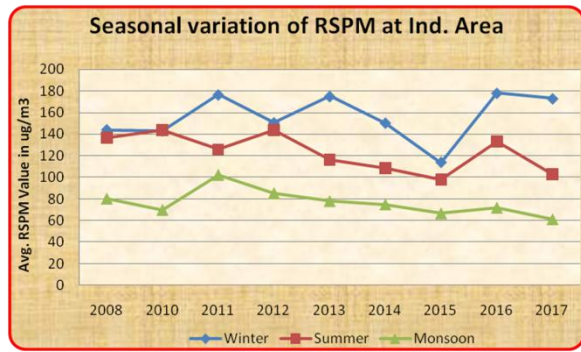
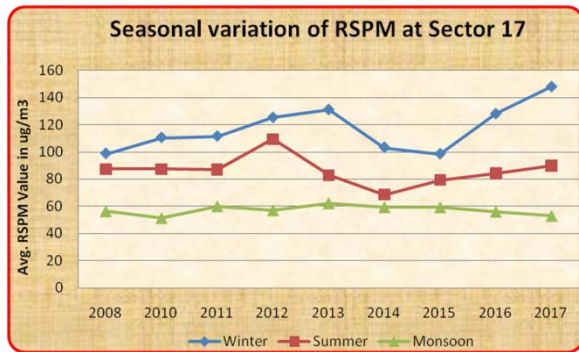
- Sampler installed at Institute of Microbial Technology Campus
- RSPM value ranges from 80 to 113 $\mu\text{g}/\text{m}^3$
- Linear Trendline shows that actually there is slight increase in concentration





- Sampler installed at Village Kaimbwala (Residential Area)
- RSPM value ranges from 78 to 119 $\mu\text{g}/\text{m}^3$
- Linear Trendline shows that actually there is no major change in concentration

Seasonal Variation in RSPM Profile



SOURCES OF AIR POLLUTION

The ambient air quality in the Chandigarh is mainly affected by:

1. Increasing number of transport vehicles.
2. Industrialization.
3. Road Dust Re-Suspension.
4. Horticulture Waste.
5. Stubble burning practices in neighbor states.
6. Construction and Demolition Activities.

1. Vehicular Pollution

- The ambient air quality in the Chandigarh has been mainly **affected by vehicles**
- **Increase** of around **60 % Nos. of Vehicles** in ten years with no change in length of roads
- **Increase** of LMVs basically **cars by more than 100 %** in last ten years in comparison to approx. **48 % increase in two wheelers** resulting in more congestion ultimately contributing in air pollution
- Chandigarh has **highest per capita no. of Cars** in India.

2. Industrialization

- Chandigarh has **very few air polluting units**
- 02 Nos. Bio-Medical Waste **Incinerators**
- Around **32 nos. Foundries** of small scale
- Some **brick kilns at the border** of Chandigarh in Punjab state
- **Impact** of **Mohali Industrial Area** and **Panchkula Industrial Area** which is very nearby to Chandigarh.

3. Road Dust Re-Suspension

- Vehicles affect the concentrations of ambient airborne particles **through exhaust emissions**, but particles are also formed in the mechanical processes in the **tyre-road interface, brakes, and engine**.
- **Particles deposited on or in the vicinity of the road** may be re-entrained, or resuspended, into air through vehicle-induced turbulence, shearing stress of the tyres and high wind speed etc.
- A commonly used term for these particles is '**road dust**'.
- The **dust** once come in **resuspension** may be there for hours or for days.

4. Horticulture Waste

- Chandigarh has total green cover (**forest cover + Tree cover**) of approx. **40.73%** of its total geographical area.
- **Pollens** are one of the reason of air pollution

- **Fallen leaves which are unattended** ultimately dried and converted into particulate matter after crushing under the vehicles and under the feet of pedestrians.

5. Biomass Burning

- Emission from **field burning of agricultural crop residue** is a common environmental hazard observed in northern India. It has a significant potential health risk due to respirable suspended particulate matter (RSPM).
- There are two main growing seasons in Punjab/Haryana. After the harvest, they often **set fire to leftover plant debris** to clear fields for the next plantings, a practice known as **stubble or paddy burning**.
- In Chandigarh also **fallen leaves during autumn** season are burnt by some of the sweepers.

Salient observations w.r.t. Ambient Air Quality of Chandigarh are as given below.

1. SO₂ values always come less and not matter of concern.
2. NO_x values although comes under the prescribed limit however trendline shows it is increasing.
3. RSPM values indicates that in PEC and Industrial Area, during last 10 years, RSPM values are slightly decreasing. However at, Village Kaimbwala, Sector 17 and IMTECH it is showing increasing trend.
4. Seasonal variations indicates that even in Monsoon season most of the time RSPM value does not meet with the standard.
5. The Ambient Air Quality in Chandigarh is mainly affected by vehicle. Around 65% no. of vehicles have been increased in last 10 years with no change in length of roads. Chandigarh has the highest per capita no. of cars in India.
6. Road dust Re-suspension is also one of the major source of RSPM.

It is very important to mention here that despite of 60% increases in number of vehicles and 100% increases in number of Light Motor Vehicles and no change in road lengths in last 10 years, RSPM values have not increased and are almost stable, because of following action taken by Chandigarh Administration:-

- Providing subsidy on Battery Operated Vehicles.
- Strict Enforcement of Pollution Under Control Certificate for all the vehicles.
- Increasing Green Cover of the City.
- Increasing Cycle Tracks and encouraging people to use them to curb the emission levels due to slow movement of vehicles on roads.