**RECOMMENDATION OF IAAPC-DELHI CHAPTER**

**BRAINSTORMING SESSION ON SHORT TERM AND LONG TERM SOLUTIONS FOR IMPROVEMENT OF AIR QUALITY IN DELHI-NCR HELD ON 30th NOVEMBER 2019.**

Indian Association for Air Pollution Control (Delhi Chapter) organised one day Brainstorming Session on 30th November 2019, titled "Long Term and Short-Term Solutions for Restoring the Air Quality in Delhi-NCR" at the Constitution Club, Rafi Marg, New Delhi. The session was attended by 40 air quality experts (attendance list attached).

Dr. J.S.Sharma (President IAAPC) extended warm welcome to all the experts and reiterated the objectives of the session. Plenty of news on air pollution in Delhi – NCR is doing rounds post Diwali 2019, during the past 6 weeks. The variety of statements published in the newspapers are often confusing to the general public. IAAPC, being a body of air quality professionals, thought it prudent to conduct a brainstorming session at this stage and submit its opinion and recommendations for the benefit of civil society.

Guest of Honour Dr. J.P.Gupta (Chairman-EAC-Industry 2) delivered the inaugural address and told the attendees not to compare the problem of Delhi with other cities of the world and try to find innovative solutions with a positive attitude. He urged the experts to pick up only 2 or 3 issues ata time, work on it to find a feasible solution.

Dr. Rakesh Kumar (Director NEERI) said that there is a need to communicate with general public in a right manner, emissions from few sources are yet to be tagged in inventory, like use of cow dung, charcoal and tyres as fuel in tandoors and domestic chulhas, garbage and solid wastes burning, etc. He said that meteorological factors are mainly responsible for the smog episodes.

Dr. J.K.Moitra (VP-IAAPC) presented an overview of existing air pollution issues in Delhi-NCR. He deliberated on following four points.

a. Instruments and Quality of Data: There are 37 CAAQMS in Delhi, that are operated by three different agencies; namely Central Pollution Control Board, Delhi Pollution Control Committee and India Meteorological Department / Indian Institute of Tropical Meteorology. The instruments have different range of measurement, the CPCB and IMD stations cap maximum $PM_{2.5}$ at 999 $\mu g/m^3$, whereas DPCC stations cap the maximum $PM_{2.5}$ at 5000 $\mu g/m^3$. Therefore, the spikes during Diwali and Smog episodes are different, leading to confusion in public. There are calibration related issues. Data from some location are not representative. Therefore, the Air Quality Index (AQI) values calculated for the 37 locations suffers from uncertainty.

b. Air Quality Index: The AQI is calculated based on hourly average values, then mean of 24 values are taken as daily average. This concept is erroneous. Implementation of

Graded Response Action Plan (GRAP) is based on AQI, therefore, all uncertainties in CAAQMS location, operation, calibration and AQI calculation should be removed.

c. Odd-Even scheme: The odd-even scheme implemented from November 4 to 14, 2019 (8 AM to 8 PM, only for private cars) showed visible impact on traffic flow, smooth congestion free flow of traffic was observed. Obviously, there was less exhaust emissions. But the impact of the odd-even scheme was not quantified.

d. Unidentified Sources: Many sources of air pollution inside Delhi are not factored in GRAP, namely from use of Diesel Engines in Railways (Shatabdi/ Rajdhani express & Shunting Engines), Increase in Aviation Traffic (Number of daily aircraft movement at IGI Airport is approx. 5000), use of CNG in automobiles and thermal power plants, untreated emissions from wood crematoria and partially treated emissions from CNG/wood crematoria, etc.

Dr. B.Sengupta (Former Member Secretary, CPCB) described the various mitigation measures required to control the non-seasonal pollution like pollution from transport, small and medium scale industry, Coal based Thermal Power Plans, MSW dumpsites and Plastic Wastes, DG sets and Construction dust and seasonal pollution like stubble burning. He stressed the urgent need for capacity building and suggested an action plan so that the air pollution issues of Delhi-NCR could be solved.

Dr. Sumit Sharma (TERI) presented the results of source apportionment study, highlighting the sources contributing to air pollution in Delhi during winter and possible reduction strategies. The experts advised TERI to validate the modelling results by using tracer techniques/ chemical finger printing studies.

Dr. Virendra Sethi (IIT-Bombay) presented an overview of lessons learnt from recent case studies. He stressed the need for Capacity Building for Planning and Implementation of source control (Compliance). He said that by using satellites, a relative measurement of pollution could be made across larger areas. Therefore, efforts towards developing a satellite for air quality measurment, and data retrieval should to be given importance

Dr. A.L.Agarwal, (Former Dy Director, NEERI) stressed that Air Shed of Delhi-NCR should be clearly defined by following a scientific approach, with Latitudes and Longitudes of each boundary. He said that the representative areal domain of each monitoring station should be defined. He also said that Source Contribution for Each Town of NCR should be done through comprehensive emission inventory, Source Apportionment Study & air pollution modeling for all three seasons.

Dr. Abhijit Pathak, (Senior Scientist, CPCB) pointed the gaps in Source Apportionment Studies conducted by different organizations, mainly because of poor and incomplete emission inventory, half-hearted use of CMB model and scanty data on organic aerosol. He

cited two examples of IIT and TERI. IIT findings indicate - Control in Fly ash and road dust can lower $PM_{2.5}$ by 54% in Summer and TERI findings indicate - Control in road dust, construction and vehicle can lower $PM_{2.5}$ by 55% in Summer. Similarly, IIT findings indicate - Control in Biomass burning and Vehicle movement can lower $PM_{2.5}$ by 51% in Winter and TERI findings indicate - Control in Biomass burning and Vehicle movement can lower $PM_{2.5}$ by 53% in Winter.

Thereafter, the experts deliberated on the issues and options and came out with following observations:

1. Two CAAQMS stations, namely Anand Vihar and ITO are located near heavy traffic area, represents the impact of vehicular pollution. Hence, they should be excluded from calculation of AQI. (Immediate Action by CPCB and DPCC)

2. Reporting of AQI should be done by taking average concentration of previous 24 hours. Calculating hourly average and then taking average of 24 values is misleading. (Immediate Action by CPCB and DPCC)

3. Use of charcoal and coal dung in Tandoors should be banned in Delhi-NCR. (Immediate by CPCB)

4. Contribution of emission sources (like stubble burning, vehicular exhaust, small and medium scale industry, coal and CNG burning in power plants, etc) to 24-hour average $PM_{2.5}$ concentration of Delhi should be presented only if derived emission factors are used and chemical transformations of $SO_2$ and NOx to sulphates and nitrates (ultimately to $PM_{2.5}$) are adequately considered. Further the results obtained after modelling should be validated using actual field measurement. Uncertainty analysis should be reported along with accuracy and precision. (Immediate direction by CPCB)

5. System should be put in place to check emission compliance in DG Engines used by Indian Railways for Rajdhani/ Shatabdi express trains and Shunting Locomotives. Emission load from such locomotives should be determined and checks and balance should be put in place during severe+ AQI. (Short Term by CPCB)

7. Emission load from all Gas based power plants in Delhi-NCR region should be determined and checks and balance should be put in place during severe+ AQI. (Short Term by CPCB

8. Emission standard for in-use DG sets should be evolved and implemented urgently. (Short Term action by CPCB)

9. Implementation of comprehensive inspection and maintenance program for in-use vehicles in place of PUC system (as recommended in Auto fuel Policy – Vision 2025 by Niti Ayog) for reduction of on-road vehicle emission. Short term action by CPCB and Transport Deptt of NCT states.

10. A group of about 200 scientists / engineers (20 for CPCB, 10-15 each for Gujarat, Maharashtra, Tamil Nadu, Orissa, Karnataka, UP, MP, Bihar, Haryana, Rajasthan, Punjab, Kerala, West Bengal, Andhra Pradesh, Himachal Pradesh etc.) should be recruited and properly trained in all aspects of air pollution management. The personnel should be recruited centrally by CPCB (after written examination, group discussion and final interview). After training they may be posted in respective state for solely working in the field of air quality management. (Long Term)

11. The air pollution mitigation group (200 personnel from CPCB and SPCBs) should be trained in following areas (Long Term)
    a) Emission inventory preparation of various air pollutants.
    b) Source apportionment studies in CPA / Non-attainment cities
    c) Development of emission factor for various air polluting industries.
    d) Air quality monitoring including calibration of analysers and data processing.
    e) EC / OC analysis of PM2.5 / PM10
    f) Emission assessment and control due to agriculture residue burning.
    g) Emission assessment and control from municipal solid waste burning
    h) Emission assessment and control from industrial plastic waste and other industrial waste burning.
    i) Vehicular pollution control including adoption of Bharat Stage VI standards
    j) Fuel quality improvement including Bharat Stage VI fuel.
    k) Retrofitting of diesel particulate filter in in-use commercial diesel vehicles.
    l) Integrated approach for inspection and maintenance for in-use (on-road) vehicles.
    m) Electric vehicle availability in fleet and recycling of lithium from battery
    n) Air pollution control from thermal power plants including SOx / NOx control by installing FGD and DeNOx system.
    o) Air pollution control from Iron and Steel plant including fugitive toxic gas emission control from coke oven batteries.
    p) Air pollution control cement plants including co-processing of waste in cement plants (dioxin/furan measurement)
    q) Air pollution control from oil refinery / petrochemical including VOC assessment.

r) Air pollution control from SSI units (brick kiln, induction and arc furnace, foundry, rerolling mills etc.)

s) Air pollution control from diesel generating sets.

t) Role of Micro meteorology in Air Pollution control .

After intense discussion and careful consideration, the experts are of the view that following measures should be taken up in entire Delhi NCR. The recommendations are given below in three categories: Immediate; Short time; Long term.

**Immediate**

1. Comprehensive inspection and maintenance system for on-road vehicles should be introduced in place of PUC system.
2. Vapour recovery system should be installed in all petrol pumps.
3. Fuel adulteration should be checked by increasing the surveillance.
4. All mobile towers in Delhi-NCR should be equipped with Solar Power or CNG fired DG.
5. All other DG sets should be operated only after installing pollution control devices to control Particulate Matter.
6. No new polluting industry should be allowed to set up in Delhi-NCR from 1-1-2020.
7. Industrial waste burning should be stopped immediately by increasing the surveillance and imposing heavy fine and imprisonment.
8. Necessary pollution prevention systems should be implemented for brick kilns, Stone crushers and hot mix plants.
9. Demonstration pilot-plants should be established for showcasing effective measures for dust control from construction sites.
10. Ensure that there is no fire in MSW dumpsites immediately by increasing the surveillance and imposing heavy fine and imprisonment.

**Short term**

1. System should be put in place to check emission compliance in Aircrafts (as per Guidelines of International Civil Aviation Organization). Emission load from IGI Airport should be determined and checks and balance should be put in place during severe+ AQI. Aircraft landing should be restricted post 5 PM during winter season.

2. Emission standard for wood-based Crematoria and CNG/Electric fired crematoria should be notified immediately and all crematoria in Delhi-NCR should be directed to install scrubbers /suitable air pollution control equipment.
3. Emission standards notified by Ministry of Environment, Forests & Climate Change in December 2017 for coal based Thermal Power Plants should be implemented immediately in Delhi-NCR.
4. Immediate measures should be taken for effective collection of Plastic Wastes and its recycling.
5. Public transport system needs immediate augmentation and should be made safe, clean and punctual with improvement in last mile connectivity.
6. In addition to above, tree plantation drive to be promoted and areas where plantation to be done be advertised for public support and cooperation.

**Long Term**

1. Policy mismatch should be rectified. A single regulatory body should be set up to deal with all matters related to prevention and control of pollution, including grant of environmental clearance to all other projects involving air pollution (except air polluting industries that should be banned).
2. Sale and Use of VOC containing paints should be banned
3. Waste to Energy plants, with internationally best available pollution control design (ensuring near zero pollution discharges) should be commissioned in Delhi-NCR.
4. Cycle track and foot path should be made user friendly and should be provided with soft carpeting with appropriate grass species. This will enormously curtail road dust.
5. From 1-4-2020 only Electric two-wheelers should be sold and registered in Delhi-NCR
6. Attractive incentives should be provided to individuals and firms who purchase and use electric vehicles
7. Clean technology should be promoted for Brick Kilns. All brick kilns should switch over to gas. demonstration plants should be installed.
8. Public awareness campaigns should be augmented with demonstration plants and / or pilot projects.