Webinar Report
Source Apportionment and Emission inventories studies in non-attainment cities in India

November 26th, 2020

Centre of Excellence for Research on Clean Air (CERCA), IIT Delhi has organized a Webinar on "Source Apportionment and Emission inventories studies in non-attainment cities in India". This Webinar aim was to bring together various Domain Experts from the Government, Think Tanks, Academia and Private sector to deliberate on the source apportionment studies carried out in different non-attainment cities in India. Also, the focus of this workshop was to bridge the gap between the researchers and regulators for better understanding of the way forward to formulate on-ground implementable strategies in these cities. The webinar was divided into two sessions for better understanding from regulator as well as from researcher's perspective.

In the introductory session, Prof. SN Tripathi, Faculty IIT Kanpur, briefed about alternative ways of doing real time source apportionment, emission inventories and capacity building under National clean air mission. He informed a large effort involving a national knowledge network to develop emission inventory with the help of CPCB across 100 non-attainment cities in India and scaling of national knowledge partners for imparting capacity building. He shared his presentation on real time PM speciation and Gas measurements and talked about different kinds of measurement methods and how we can use them for near real time information about the sources for air quality management. He explained his experiments at three locations in Delhi where they have deployed a complete set of instruments for real time monitoring and developed a source finder tool SoFi to get environmental feasible source apportionment and shared inferences from these experiments. He further elaborated on linking PM 2.5 oxidative potential with the sources to prioritize the mitigation of sources specifically for Delhi city. He recommended that this measurement information can be used by regulators to understand how sources change during the period of time.

Dr. Prashant Gargava shared his observations from the last 4 or 5 years that air pollution has become a subject of concern and there is a need for fastrack actions to meet demands of clean air. He also stressed upon the necessity of substantial scientific inputs/knowledge in policy making framework to achieve the better air quality. He talked about gaps in terms of data and knowledge/information in the clean air action plans for cities. He emphasized on the need for detailed scientific analysis of sources and their contribution while preparing the action plans based on the available information. He recommended the quantification of source contribution to allocate the resources in a judicious manner. He also discussed the different techniques/tools domain to work out estimates and suggest that the final policy direction should have combined results of these different tools and techniques and ensure all the cities should follow the uniform methodology and robust protocols to estimate source contribution and plan accordingly to the data required. He also informed NACP implementation progress in terms of physical and financial aspects and change in air quality levels. CPCB is also working on mechanisms to track progress, developing city specific dashboard and policy actions initiated at national level including BS6 implementation, revised power plants norms and installation of FGD. He specifically mentioned that

NCAP has both components of the city plan as well as the national plan. He advised researchers to conduct their own indigenous studies on estimation of pollutant levels as data reporting in the Global air quality 2020 report were overestimated due to lack of proper ground based data.

Dr. Dipankar Saha, from WBPCB, discussed Source apportionment and emission inventories studies in west bengal perspective. He outlined the various source apportionment techniques have been developed including receptor based statistical methods, back-trajectory models, and chemical transport model based methods. He advocated the need to integrate and compare the different methods for source apportionment of air pollutants. He also suggested preparing time targeted action plans in a focused way, based on infra-structural and socio-economic settings to address sustainable and long term solutions. He discussed the various issues while preparing the emission inventory which can vary with operation, product, fuel, season etc. and missing information like grid data, hot spots etc. He informed about IIT delhi and WBPCB MoU for source apportionment of air pollutants, development of emission inventory and carrying capacity determination for Durgapur and Asansol-Raniganj Areas, Haldia and Barrackpore cities. The major components on which they work together will be emissions load assessment, regional influence and integrating the information from source apportionment and emission inventory to identify and quantify the correct contribution of each point, area, and line sources active in all the areas. He concluded his talk suggesting areas for future development to study the impact of secondary aerosols and preparing source location maps utilizing air parcel trajectory.

Er. JS Majithia from Punjab Pollution control Board shared how AQM plans will work for non attainment cities in Punjab which follows the Monitor-Plan-Execute cycle. These plans will be executed by various ULB's and other departments. He informed that an emergency response system is being drafted and notified and will be issued by the state government and a public grievance redressal portal is also established. While talking about major roles and responsibilities of stakeholder departments he clearly described all the related activities which should be a part of mitigation strategies and there is a need of involvement of citizens while implementing these regulations. He also informed that the 9 actions plans have been approved by CPCB and IIT Delhi is already engaged for source apportionment and carrying capacity studies in 7 non attainment cities which is under progress. He concluded with recommendation to implement the SA and EI studies at grass root level and there is need of coordination among all stakeholders departments to achieve the target under NCAP.

Dr. Ananya Das from Bihar Pollution control board talked about source apportionment studies in three non attainment cities in Bihar namely Patna, Muzaffarpur & Gaya in which transportation, industries, solid-waste management & domestic sector's contribution were analyzed. They have calculated ERP's(Emission Reduction Potential) on the basis of different scenario combinations. They have also done health impact analysis & economic losses in terms of health(COPD, Lower Respiratory Infections, Premature Mortality). Now they are working on existing policies/interventions in the State of Bihar, to curb the effects of Air Pollution. She mentioned the city wise sectoral contribution of air pollutants in the year 2019. She further elaborated on the geological formation of dust particles which is the basic reason behind the elevated PM2.5 and 10 levels in major cities of bihar. She shared recommended sector wise control measures based on the SA and EI studies for curbing air pollution in these three cities. She informed BSPCB signed a MoU with IIT Delhi to find out sources of air pollution using remote sensing and GIS. Also, BSPCB is in the

process of signing MoU with IIT Kanpur for SA and EI study for Patna, Muzaffarpur and Gaya starting from the year 2021.

Mr. Sunil Dahiya, from CREA, highlighted some aspects related to SA and EI studies from NCAP framework and mentioned some key points related to unified guideline for source apportionment study, comprehensive national emission inventory which is still lacking in the country will be formalized under the NCAP. He also mentioned that a preliminary state action plan for air pollution needs to be formulated for all 23 states which harbour 102 nonattainment cities. Also a comprehensive regional Plan should be formulated incorporating the inputs from the regional source apportionment studies. He outlined some of the lagging issues concerning the availability of information in the public domain for the groups which are not part of NCAP implementation. He suggested introducing the scope for integrating load based pollution reduction approach with percentage pollution reduction targets for key sectors and regions with emission load caps. He put forth the idea of availability of emission inventory (for specific cities as well as national) in the public domain which could be the key to air quality improvements through public participation in monitoring, self reflection and enhanced accountability of the regulator as well as polluters. He also suggested the correlation establishment between policy measure/action taken and air quality improvements by independent researchers at regular intervals by updating base inventory. He advocates the engagement of civil society and other stakeholders such as farmers etc. while formulating/advocating solutions for emission load reduction for identifying feasible solutions and alternatives to existing pollution based operations of certain sectors. He concluded with recommendation to reach out to diverse stakeholders and raise awareness on the problem, solutions, opportunities and benefits.

Prof. Gazala Habib, Professor, IIT Delhi, presented the overview of National carbonaceous aerosol program on emission inventory and source apportionment. She briefed about source contribution at 11 receptor sites which is selected using the aerosol optical depth data. This study includes the measurement of particles, chemical characterization of organic carbon, ions, trace metals and molecular markers and sources will be identified using the positive matrix factorization and their contribution to the receptor site. She showed his experiments inferences for Annual mean PM2.5 mass concentrations at 11 receptor sites exceeding the NAAQs standards. She outlined some drawbacks in current emission estimates for India which need to be improvised for correct representation of emission in climate and air quality models. She further elaborated on development of nations level emission inventory including field survey, development of multipollutant emission measurement system, development of chemical speciated source profile, district village wise emission estimate using the 3 tier methodology by IPCC. For activity estimation, a digitized data collection app was designed under this project. The data collected will be available on an online portal as part of NCAP program. She also informed about an online portal SMoG- India designed by IIT Bombay, for emission inventory data management visualization in map form as well as in tabular form.

Prof. Suresh Jain from IIT Tirupati, shared a case study of SA and EI in Andhra Pradesh. He explained the overall approach for local air quality management and dispersion modelling to understand the different types of sources contributing to the city and then based on the entire integrated approach an air quality management plan can be developed for the particular city. He further explained the importance of land use land cover mapping for Vijayawada city, for understanding the development of the city beyond the actual boundaries. He gave an example of a road network in the city

by showing 1X1 Km grid categorized according to vehicular load. He also said a detailed emission inventory is representative of particular area and provide indeginous information of the city. He mentioned some of the focus sectors/ areas which should be considered while doing the source apportionment studies. Further, he recommends air quality management using an airshed approach for understanding of pollutants influx and outflux which can help to abate the pollution not only in the city as well beyond the boundaries.

Dr. Sunil Gulia, Senior Scientist NEERI, discussed his work of source apportionment in Jamshedpur city in Jharkhand using the approach of assessment of air quality issues leading to delineation and evaluation of air quality improvement plans while taking care of the complete formulation of management plan. He talked about the heterogeneity in sources having diurnal variation which is a major challenge in the cities. He highlighted his review work on assessment of land use specific source contribution in Indian cities specifically selection of monitoring location is an important step in any source apportionment study. He further elaborated on the variations in source contribution assessment in different studies which might be due to instrumentation or methods adopted. In that case, he recommends a land use specific protocol considering all associated variables should be the prime focus for designing source apportionment methodologies for their effective implementation. He explained the approach for any air quality management study with an objective to delineate an integrated comprehensive and robust air quality management plan for the city in a sustainable manner. He vividly explained the study components and its interaction for the plan for Jamshedpur city project by analyzing the secondary data, historical trends and understanding the geography of the region.