Item No. 03 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

(BY VIDEO CONFERENCING)

Original Application No. 19/2021
(Earlier O.A.No.618/2016)

Sanjay Kumar Applicant

Versus

State of UP & Ors. Respondent(s)

Date of hearing: 27.03.2023

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE DR. A. SENTHIL VEL, EXPERT MEMBER

Respondent: Mr. Pradeep Misra & Mr. Daleep Dhyani, Advocates for UPPCB

ORDER

1. The issue for consideration is permissibility of operation of hot mix plants at Noida beyond 'carrying capacity' of the ambient air of the area as per assessment of the statutory regulators – the CPCB and the State PCB, thereby adversely affecting the environment and the public health.

2. The matter was considered by the Tribunal earlier, more than six years back, vide order dated 23.11.2016 in O.A. No. 618/2016. Considering the status of compliance and adverse impact on air quality, the Tribunal directed sealing of all the hot mix plants. As a result, many hot mix plants shifted elsewhere. Vide order dated 20.11.2019, the Tribunal directed that the remaining may remain sealed till compliance of norms. The State PCB was directed to file status report which was to be

registered as a fresh OA. Accordingly, on report dated 4.12.2020 being filed by the State PCB, the office registered the present O.A. which was considered on 24.02.2021.

3. The Tribunal held that the report does not consider the issue of carrying capacity of the area to sustain activities like hot mix plants and the siting criteria, including the inter-se distance followed so as not to violate the right of the citizens in the area to breathe fresh air. The Tribunal accordingly directed consideration of these aspects by a Joint Committee of CPCB and State PCB and to furnish a report to this Tribunal. The operative part of the order is reproduced below:

> *"3. We have considered the above report* ***which has not addressed the issue of carrying capacity of the area to sustain activities like hot mix plants and the siting criteria, including the inter-se distance followed so as not to violate the right of the citizens in the area to breathe fresh air. This observation is in the context of air quality in NCR which led to restrict activities with pollution potential. In this regard reference is made to the order dated 17.02.2021 in O.A. No. 1016/2019, Utkarsh Panwar v. Central Pollution Control Board & Ors., requiring regulation of brick kilns in the NCR in the light of the carrying capacity, till they are fired by coal generating air pollution. Question of use of cleaner fuel may require consideration in the context of hot mix plants also.***
>
> *4.* ***Let a joint Committee of the CPCB and the State PCB look into the above aspects to determine whether and to what extent and subject to what safeguards hot mix plants can be sustained following the "Sustainable Development" and "Precautionary" principles, in the interest of public health.*** *The State PCB will be nodal agency for coordination and compliance. The report be furnished to the Tribunal by 30.04.2021 by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/ OCR Support PDF and not in the form of Image PDF."*

4. The matter was further considered on 09.09.2021 in light of report of the joint Committee dated 22.06.2021 to the effect that supporting carrying capacity to sustain the hot mix plants in the study area was in the negative. It was ,however, suggested that in view of dependence of construction activities on hot mix plant, the existing plants be continued

subject to compliance of siting criteria. The recommendations in the report were as follows:-

> ***"3.0 RECOMMENDATIONS:***
>
> *It is to mention that this cluster of hot mix plants is the only cluster supplying raw material for pot-hole free roads, re-surfacing of roads, black topping of earthen roads to the concerned govt. agencies involved in maintenance & development of the rural/urban infrastructure in Noida & Greater Noida. Total 06 hot mix plants are in operation under direction of Hon'ble NGT, New Delhi in the said matter and are under regular monitoring of SPCB.*
>
> *i.* ***Since, the carrying capacity of the study area is estimated to be negative and therefore, following actions are suggested to support & protect the air environment:***
>
> - ***a. No new hot mix plant may be allowed to establish & operate in the area including any expansion of the existing units.***
> - ***b. The supporting infrastructure such as road needs to be improved, development of green belts and provision of water sprinkling in in the hot mix plants in order to control the fugitive dust emission.***
>
> ***ii. Siting criteria will be applicable for new establishment. Existing establishments should take appropriate environmental friendly practices. In future Hot mix plants shall be setup as per siting policy/guidelines. However, they may follow criteria as below:***
>
> - ***a. It should be located in area wherever permissible and atleast 100 meters away from residential dwellings, health centres/hospitals & schools,***
> - ***b. Atleast 200 meters away from water spread area of major watercourses like Lake, canal and major drinking water sources,***
> - ***c. Away from flood plain area of River and areas having shallow groundwater***
> - ***d. Atleast 50 meters of inter-se distance between two establishments (each establishment should provide 25 meters from each side) should be provided and developed green belt.***
> - ***e. Carrying capacity of the area may be considered while allowing new hot mix plant.***
>
> ***i. At present these plants are using diesel as a fuel, recommended installation of additional Alkali scrubber to minimize of SO_2 and NO_2 emission."***

5. Considering the above, the Tribunal held that in the interest of environment and public health and compliance of law laid down by the Hon'ble Supreme Court and earlier orders of this Tribunal, polluting

activities could not be allowed and even hot mix plants already set up could not be allowed to continue against the laid down siting criteria. With regard to the difficulty on account of closure of such activities, the Tribunal directed that available technological options be considered for which a seven Member joint Committee was constituted. The operative part of the order is reproduced below:-

> *"7. Adverse health impact of polluted air quality has been noted inter-alia in judgement of Hon'ble Supreme Court in M.C. Mehta v. UOI[1], M.C. Mehta v. UOI[2], M.C. Mehta v. UOI[3] and K. Guruprasad Rao v. State of Karnataka[4] and order of this Tribunal dated 17.02.2021 in O.A. No. 1016/2019, Utkarsh Panwar v. CPCB & Ors. wherein the Tribunal directed stopping of all brick kilns in NCR beyond the assimilative carrying capacity in the air in NCR, till such brick kilns shift to PNG. Till shifting to PNG, it was directed that the brick kilns cannot operate except in limited number and only from March to June when assimilative air capacity permits such operations. The impact of air pollution on public health is noted in the order of the Hon'ble Supreme Court in Arjun Gopal & Ors. v. UOI & Ors.[5]:*

Table 1

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 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 May (401-500)	***May cause respiratory impact even on healthy people, and serious health impacts on people with lung/heart disease. The health impacts may be experienced even during light physical activity.***

> *8. In view of acknowledged adverse health effects and extent of carrying capacity to sustain the polluting activity of the hot mix plants, the question is further course of action to be adopted.*

[1] (1998) 9 SCC 149
[2] (2000) 7 SCC 422
[3] (2002) 4 SCC 378
[4] (2012) 12 SCC 736
[5] (2017) 1 SCC 412

9. In Arjun Gopal & Ors. v. UOI & Ors.[6], it was observed that the residents of NCR faced severe air quality standards which were worst in the World. It had serious adverse health impact. Life of citizens in NCR had been brought to virtual standstill. The Capital was placed in an environmental emergency of unseen proportions. It will be appropriate to extract some observations from the judgment:-

> *"4. The onset of winter and the festival/marriage season this year, presented to the residents of NCR severe concerns regarding the air quality standards. According to reports, the air quality standards in early November of this year were the worst in the world.* ***It is reported that the $PM_{2.5}$ levels recorded were "beyond scale" values (see India's Air Quality Among World's Worst Over Diwali Weekend: Report. 4-11-2016, Hindustan Times). The report indicates that 24-hour average of $PM_{2.5}$ levels in South Delhi in 2016 were 38% higher than on the Diwali night of 2015. The day after Diwali, these levels were twice as high as the day after Diwali in 2015, crossing 650 $\mu g/m^3$, which is 26 times above the WHO's standards or levels considered safe. Shockingly, on the morning of 1-11-2016, Delhi woke up to an average $PM_{2.5}$ level of over 700 $\mu g/m^3$ — some of the highest levels recorded the world over and 29 times above WHO standards. The report further states that the WHO guideline for 24-hour average $PM_{2.5}$ levels is 25 $\mu g/m^3$ and with an annual average $PM_{2.5}$ level of 122 $\mu g/m^3$, Delhi's air is the worst among global megacities with dense populations. We have particularly referred to the PM 2.5 levels because of the extreme effects and near invisibility of this type of particulate matter. $PM_{2.5}$ or particulate matter 2.5 ($PM_{2.5}$), refers to tiny particles or droplets in the air that are two-and-one-half microns or less in width. It may be noted that the widths of the larger particles in the $PM_{2.5}$ size range would be about thirty times smaller than that of a human hair. These particles primarily emanate from vehicle exhausts and other operations that involve the burning of fuels such as wood, heating oil or coal, and of course, use of fire crackers.***
>
> ***5. In India, air quality standards are measured in terms of the Air Quality Index (hereinafter "AQI"). The AQI was launched in India on 17-10-2014 by the Ministry of Environment and Forests. According to the press release of the Press information Bureau of the same date, it consists of a comprehensive set of parameters to monitor and asses the air quality. The AQI considers eight pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, O_3, NH_3, and Pb), and based on the levels of these pollutants six categories of AQI ranging from "Good" to "Severe" have been prescribed. The index also suggests the health effects of the pollution categorywise. The gradation of AQI and its health impact is extracted below:***
>
> Tables 1 and 2 have already been reproduced in para 1 above and are not being repeated.
>
> ***xxx.....xxx .....xxx***

[6] (2017) 1 SCC 412

xxx.....xxx xxx

6. Reports indicate that AQI in Delhi was much above the severe standard, shooting off the AQI 500 mark on many days this November. On the day after Diwali, it was more than 14 times the safe limits (see Delhi's Pollution Levels Peaks at 14-16 Times Safe Limits, 31-10-2016, The Hindu). The adverse health effects of these hazardous levels of pollution are only too evident from the table given above. We do not intend to refer to the multiplicity of reports and data on this front.

7. The hazardous levels of air pollution in the last few weeks has spared very few from its ill effects. The life of the citizens of NCR was brought to a virtual standstill, not to speak about the plight of the thousands of mute flora and fauna in NCR. Schools were declared shut, denizens of the city advised to stay indoors, construction activities stopped, power stations shut and ban imposed on burning of garbage and agricultural waste. The fall in air quality has had a significant impact on people's lifestyle as well. The rising costs to protect against air pollution are substantial. It has come to our notice that people are queuing up to purchase protective masks and air purification systems in the wake of dense smog all over the NCR. In short, the capital was "smogged" into an environmental emergency of unseen proportions.

8. The adverse effects of these extreme levels of air pollution spare no one — the young, the old, the infirm and even the future generations. A study of the data of the Global Health Depository of the World Health Organisation reveals that India has the world's highest death rate from chronic respiratory diseases and that about 1.5 million people in India die annually due to indoor and outdoor pollution (see Delhi Wakes up to an Air Pollution Problem it cannot Ignore, 15-2-2015, The New York Times). The Kolkata-based Chittaranjan National Cancer Institute (CNCI), in a study commissioned and handed over to the Central Pollution Control Board, found that key indicators of respiratory health, lung function to palpitation, vision to blood pressure, of children in Delhi, between four and 17 years of age, were worse off than their counterparts elsewhere. It also found that more than 40% of the school children suffer from lung damage (see Landmark Study Lies Buried, 2-4-2015, The Indian Express). We note with apprehension that there are nascent studies that suggest that pollution can lower children's IQ, hurt their test scores and increase the risks of autism, epilepsy, diabetes and even adult-onset diseases like multiple sclerosis (see Holding Your Breath in India, 29-5-2015, The New York Times).

9. It has been brought to our notice that the severe air pollution in the NCR is leading to multiple diseases and other health related issues amongst the people. It is said that the increase in respiratory diseases like asthma, lung cancer, bronchitis, etc. is primarily attributable to the worsening air quality in the NCR. The damage being caused to people's lungs is said to be irreversible. Other health related issues

like allergies, temporary deafness are also on the rise. Various experts have pointed towards multiple adverse effects of air pollution on human health like premature deaths, rise in mortality rates, palpitation, loss of vision, arthritis, heart ailments, cancer, etc.

10. When we refer to these extreme effects, we are not merely referring to the inconvenience caused to people, but to abject deprivation of a range of constitutionally embedded rights that the residents of NCR ought to have enjoyed. Needless to state, the grim situation of air quality adversely affected the right to education, work, health and ultimately, the right to life of the citizens, and this Court is constitutionally bound to address their grave concerns. May we remind ourselves, that this is not the first time that this Court was impelled into ensuring clean air for the citizens of the capital region (see M.C. Mehta v. Union of India [M.C. Mehta v. Union of India, (1998) 6 SCC 60] , [M.C. Mehta v. Union of India, (1998) 9 SCC 589] , M.C. Mehta v. Union of India [M.C. Mehta v. Union of India, (1998) 8 SCC 648] and M.C. Mehta v. Union of India [M.C. Mehta v. Union of India, (1998) 8 SCC 206]).”

10. The precautionary principle has been elaborated in A.P. Pollution Control Board case [A.P. Pollution Control Board v. M.V. Nayudu, (1999) 2 SCC 718] as under:

“31. The “uncertainty” of scientific proof and its changing frontiers from time to time has led to great changes in environmental concepts during the period between the Stockholm Conference of 1972 and the Rio Conference of 1992. In Vellore Citizens' Welfare Forum v. Union of India [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] a three-Judge Bench of this Court referred to these changes, to the “precautionary principle” and the new concept of “burden of proof” in environmental matters. Kuldip Singh, J. after referring to the principles evolved in various international conferences and to the concept of “sustainable development”, stated that the precautionary principle, the polluter pays principle and the special concept of onus of proof have now emerged and govern the law in our country too, as is clear from Articles 47, 48-A and 51-A(g) of our Constitution and that, in fact, in the various environmental statutes, such as the Water Act, 1974 and other statutes, including the Environment (Protection) Act, 1986, these concepts are already implied. The learned Judge declared that these principles have now become part of our law. The relevant observations in Vellore case [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] in this behalf read as follows: (SCC p. 660, para 14)

‘14. In view of the abovementioned constitutional and statutory provisions we have no hesitation in holding that the precautionary principle and the polluter pays principle are part of the environmental law of the country.’

The Court observed that even otherwise, the abovesaid principles are accepted as part of the customary international law and hence there should be no difficulty in accepting them as part of our domestic law. In fact, on the facts of the case before this Court, it

was directed that the authority to be appointed under Section 3(3) of the Environment (Protection) Act, 1986

'shall implement the "precautionary principle" and the "polluter pays principle"'.

The learned Judges also observed that the new concept which places the burden of proof on the developer or industrialist who is proposing to alter the status quo, has also become part of our environmental law.

32. The Vellore [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] judgment has referred to these principles briefly but, in our view, it is necessary to explain their meaning in more detail, so that courts and tribunals or environmental authorities can properly apply the said principles in the matters which come before them.

33. ***A basic shift in the approach to environmental protection occurred initially between 1972 and 1982. Earlier, the concept was based on the "assimilative capacity" rule as revealed from Principle 6 of the Stockholm Declaration of the U.N. Conference on Human Environment, 1972. The said principle assumed that science could provide policy-makers with the information and means necessary to avoid encroaching upon the capacity of the environment to assimilate impacts and it presumed that relevant technical expertise would be available when environmental harm was predicted and there would be sufficient time to act in order to avoid such harm. But in the 11th Principle of the U.N. General Assembly Resolution on World Charter for Nature, 1982, the emphasis shifted to the "precautionary principle",*** *and this was reiterated in the Rio Conference of 1992 in its Principle 15 which reads as follows:*

'Principle 15.—In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for proposing cost-effective measures to prevent environmental degradation.'

34. In regard to the cause for the emergence of this principle, Charmian Barton, in the article earlier referred to in "The Status of the Precautionary Principle in Australia" [(1998) 22 Harvard Environmental Law Review 509 at p. 547] says:

'There is nothing to prevent decision-makers from assessing the record and concluding that there is inadequate information on which to reach a determination. If it is not possible to make a decision with "some" confidence, ***then it makes sense to err on the side of caution and prevent activities that may cause serious or irreversible harm****. An informed decision can be made at a later stage when additional data is available or resources permit further research. To ensure that greater caution is taken in environmental management, implementation of the principle through judicial and legislative means is necessary.'*

In other words, the inadequacies of science is the real basis that has led to the precautionary principle of 1982. It is based on the theory that it is better to err on the side of caution and prevent environmental harm which may indeed become irreversible.

35. The principle of precaution involves the anticipation of environmental harm and taking measures to avoid it or to choose the least environmentally harmful activity. It is based on scientific uncertainty. Environmental protection should not only aim at protecting health, property and economic interest but also protect the environment for its own sake. Precautionary duties must not only be triggered by the suspicion of concrete danger but also by (justified) concern or risk potential. The precautionary principle was recommended by the UNEP Governing Council (1989). The Bomako Convention also lowered the threshold at which scientific evidence might require action by not referring to "serious" or "irreversible" as adjectives qualifying harm. However, summing up the legal status of the precautionary principle, one commentator characterised the principle as still "evolving" for though it is accepted as part of the international customary law, 'the consequences of its application in any potential situation will be influenced by the circumstances of each case'. (See First Report of Dr. Sreenivasa Rao Pemmaraju — Special Rapporteur, International Law Commission dated 3-4-1998, paras 61 to 72.)"

(emphasis in original)

"36. We shall next elaborate the new concept of burden of proof referred to in Vellore case [Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647] at p. 658. In that case, Kuldip Singh, J. stated as follows: (SCC p. 658, para 11)
'(iii) The "onus of proof" is on the actor or the developer/industrialist to show that his action is environmentally benign.'

37. It is to be noticed that while the inadequacies of science have led to the "precautionary principle", the said "precautionary principle" in its turn, has led to the special principle of burden of proof in environmental cases where burden as to the absence of injurious effect of the actions proposed, — is placed on those who want to change the status quo (Wynne, "Uncertainty and Environmental Learning: Reconceiving Science and Policy in the Preventive Paradigm" [(1992) 2 Global Environmental Change 111 at p. 123]). This is often termed as a reversal of the burden of proof, because otherwise in environmental cases, those opposing the change would be compelled to shoulder the evidentiary burden, a procedure which is not fair. Therefore, it is necessary that the ***party attempting to preserve the status quo by maintaining a less polluted state should not carry the burden of proof and the party who wants to alter it, must bear this burden.*** *(See James M. Olson, "Shifting the Burden of Proof: How the Common Law can Safeguard Nature and Promote an Earth Ethic" [(1990) 20 Environmental Law 891 at p. 898] .) (Quoted in "The Status of the Precautionary Principle in Australia" [(1998) 22 Harvard Environmental Law Review 509 at p. 547] at pp. 519, 550.)*

38. The precautionary principle suggests that where there is an identifiable risk of serious or irreversible harm, including, for example, extinction of species, widespread toxic pollution in major threats to essential ecological processes, it may be appropriate to place the burden of proof on the person or entity proposing the activity that is potentially harmful to the environment. (See Report of

Dr Sreenivasa Rao Pemmaraju, Special Rapporteur, International Law Commission, dated 3-4-1998, Para 61.)"

(emphasis in original)

11. In Vellore Citizens' Welfare Forum case, 1996) 5 SCC 647, the Hon'ble Supreme Court banned the tanneries when it was found that they were causing immense damage to the environment. Environment protection, which is a facet of Article 21, was given supremacy over the right to carry on business enshrined in Article 19(1)(g). Following the said principle, it has been held that protection of right to health will have to be given priority. Health hazards in the form of various diseases that are the direct result of air pollution are well known. It leads to asthma, coughing, bronchitis, retarded nervous system breakdown and even cognitive impairment. Some of the diseases continue on a prolonged basis. Some of these which are caused because of high level of $PM_{2.5}$ are even irreversible. In such cases, patients may have to continue to get the medical treatment for much longer period and even for life. Though there are no statistics as to what would be the cost for treating such diseases which are as a direct consequence of fireworks on these occasions like Diwali, it can safely be said that this may also be substantial.

12. It is well known that Carrying capacity is a facet of sustainable development. It is inherent in 'Precautionary Principle' as well as in 'Inter-generational Equity'. In MC Mehta v. UOI & Ors.[7]*,* ***construction activity in the catchment area of Badkhal were directed to be restricted/regulated to the level of Carrying capacity.*** *It was observed that:-*

> ***"Preventive measures have to be taken keeping in view of the carrying capacity of the ecosystem operating in the environmental surroundings under consideration."***

13. In Vellore Citizens' Welfare Forum v. UOI & Ors.[8]*, it was observed that quality of human life is to be improved within the carrying capacity to supporting ecosystem. Relevant extract is as follows:-*

> ***"****10……* ***During the two decades from Stockholm to Rio "Sustainable Development" has come to be accepted as a viable concept to eradicate poverty and improve the quality of human life while living within the carrying capacity of the supporting ecosystems****. "Sustainable Development" as defined by the Brundtland Report means "Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs". We have no hesitation in holding that "Sustainable Development" as a balancing concept between ecology and development has been accepted as a part of the customary international law though its salient features have yet to be finalised by the international law jurists.****"***

14. These observations are reiterated in (2006) 6 SCC 371.[9]

[7] (1997) 3 SCC 715
[8] (1996) 5 SCC 647
[9] Para 66 to 76

Tribunal's Approach to the subject

15. The Tribunal has a mandate to follow these principles under Section 20 read with Section 15 of the NGT Act and can issue appropriate directions for enforcement of these principles, as laid down in Mantri Techzone Pvt. Ltd. v. Forward Foundation and Ors.,[10] *and the Director General (Road Development) NHAI v. Aam Aadmi Lok Manch.*[11] *Environmental rule of law requires strict enforcement of these principles as laid down in Hanuman Laxman Aroskar v. UOI).*[12]

16. This Tribunal in O.A. No. 681/2018, vide order dated 21.08.2020, dealt with the remedial measures for restoration of air quality in 122 Non-attainment cities, including Delhi where air quality is generally beyond norms. The Tribunal directed stopping polluting activities, including brick kilns and assessment of carrying capacity of urban areas to take policy decisions to control polluting potential activities beyond carrying capacity. The Tribunal observed:-

> *"3. The Tribunal noted the concern arising from such large scale air pollution which grapples the country in spite of statutory mechanism under the Air Act, directions of the CPCB under section 18(1)(b), dated 29.12.2015 and directions of the Hon'ble Supreme Court for control of* ***vehicular pollution***[13]***, industrial and construction sector pollution***[14]***, power sector pollution***[15] ***and agricultural sector pollution***[16] *and orders of this Tribunal dealing with the said issues*[17]*. The Tribunal also referred to a Comprehensive Action Plan (CAP) for air pollution control for NCR prepared in pursuance of order of the Hon'ble Supreme Court dated 06.2.2017 by the Environment Pollution (Prevention and Control) Authority (EPCA) in consultation with the CPCB and Delhi Pollution Control Committee (DPCC) on 05.04.2017*[18] *and Graded Response Action Plan (GRAP) notified by the MoEF&CC on 12.01.2017 stipulating specific steps for different levels of air quality such* ***as improvement in emission and fuel quality and other measures***

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[10] 2019 SCC online SC 322, Para 43-47

[11] AIR 2020 (SC) 3471, Para 75

[12] (2019) 15 SCC 401

[13] Rural Litigation and Entitlement Kendra, Dehradune and Others Vs State of U.P. Others (1985) 2 SCC 431, M.C. Mehta v. Union of India (2001) 3 SCC 756, M.C. Mehta v. Union of India (1998) 6 SCC 63, M.C. Mehta v. Union of India (2002) 4 SCC 356, M.C. Mehta v. Union of India (1998) 6 SCC 60

[14] M.C. Mehta v. Union of India (1997) 2 SCC 353, M.C. Mehta v. Union of India and Shriram Foods and Fertilizer Industries and Anr. (1986) 2 SCC 176, Rural Litigation and Entitlement Kendra, Dehradun v. State of U.P. (1985) 2SCC 431, Mohd. Haroon Ansari v. District Collector (2004) 1 SCC 491, Union of India v. Union Carbide Co. (1989) 1 SCC 674, M.C. Mehta v. Union of India (1992) 3 SCC 256, Sterlite Industries (India) Ltd. etc. v. Union of India & Ors.(2013) 4SCC 575 , M.C. Mehta v. Union of India (2004) 6 SCC 588, M.C. Mehta v. Kamal Nath (2000)6 SCC 213

[15] Consumer Education and Research Centre v. Union of India (1995)3 SCC 42, Dahanu Taluka Environment Protection group and Ors. v. Bombay Suburban Electricity Supply Company Ltd. and Ors (1991) 2SCC 539

[16] Arjun Gopal and Ors v. Union of India and Ors (2017) 16 SCC 280, Dr. B.L Wadhera v. Union of India and Ors (1996) 2 SCC 594

[17] Vardhman Kaushik v. Union of India and Ors. O.A no. 21 of 2014, Vikrant Kumar Tongad v. Environment Pollution (Prevention and Control) Authority and Ors, O.A No. 118 of 2013, Satish Kumar v. Union of India and Ors, O.A. No. 56 (T_{HC}) OF 2013, Smt. Ganga Lalwani V. Union of India and Ors. O.A No. 451 of 2018

[18] Report No.71, EPCA-R/2-17/L-21, Comprehensive Action Plan for air pollution control with the objective to meet ambient air quality standards in the National Capital Territory of Delhi and National Capital Region, including states of Haryana, Rajasthan and Uttar Pradesh.

for vehicles, strategies to reduce vehicle numbers, non-motorised transport network, parking policy, traffic management, closure of polluting power plants and industries including brick kilns, control of generator sets, open burning, open eateries, road dust, construction dust, etc.[19]

4. Implementation of prescribed norms in the light of legal provisions and court directions remains a challenge. The consequence is that India is being ranked high in terms of level of pollution compared to many other countries with enormous adverse impact on public health. Most victims are children, senior citizens and the poor.[20]

5. ***The GRAP categorises levels of pollution as severe plus, severe, very poor, moderate to poor. The action to be taken in such situations includes stopping entry of trucks, stopping construction activities, odd and even scheme of private vehicles, shutting of schools, closing of brick kilns, stone crushers, hot mix plants, power plants, intensifying public transport services, mechanized cleaning of road, and sprinkling of water, stopping the use of diesel generator sets, enhancing parking fees, etc.***

6. ***The MoEF&CC has by various notifications put restrictions on activities in Coastal areas, Flood plains, Taj corridor Eco-sensitive zones, etc. in view of ecological sensitivity and impact of such activities on environment if such activities are carried out in unregulated areas. This needs to be extended to the NACs in view of impact on public health and environment to give effect to the 'Precautionary' and 'Sustainable Development' principles****."*

7to13..xxx……xxxx……xxx

17. Dealing with the issue of air pollution in manufacture of tiles at Morbi in Gujrat, vide order dated 6.3.2019 OA 20/17 Babubhai v GPCB, this Tribunal directed closure of industries operating with coal unless they shifted to natural gas. While under the orders of the Hon'ble Supreme Court, GRAP was laid down providing for closing of specified activities on crossing of air quality norms as laid down in the GRAP, the same did not debar consideration of further situations requiring closure/regulation.

18. We may also refer to direction issued by the CPCB on 27.11.2020 under Section 18 (1) (b) of the Air (Prevention & Control of Pollution) Act, 1981 for upcoming industrial units in NCR ***to use only gas*** *and also refers to an earlier order requiring even the existing industries in NCR Delhi,* ***to shift to PNG by 31.03.2019 where gas supply is available****. The relevant part of the order is quoted below:-*

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[19] S.O.118(E), Notification, Ministry of Environment, Forest and Climate Change

[20] https://www.thehindu.com/sci-tech/energy-and-environment/india-ranks-177-out-of-180-in-environmental-performance-index/article22513016.ece, https://www.ndtv.com/delhi-news/delhis-air-pollution-has-caused-of-death-of-15-000-people-study-1883022.

"xx xx xx xx

Whereas, considering the Considering deteriorating air quality in NCR-Delhi and also the fact that ***already directions have been issued to all the existing industries in NCR-Delhi to switch over to cleaner fuels, it is decided that only those new industrial units shall be allowed to set-up in NCR-Delhi, which use cleaner fuels namely, natural gas (PNG/CNG), liquefied petroleum gas, bio gas, propane, butane etc. and***

Now therefore, in view of the above and exercising the powers conferred under section 8(1)(b) of Air (Prevention and Control of Pollution) Act, 1981, you are hereby directed to allow only those new industrial units in NCR-Delhi, which are using cleaner fuels, namely, natural gas (PNG/CNG), liquefied petroleum gas, bio-gas, propane, butane etc."

19. Having regard to the above considerations, the Tribunal has passed recent orders to deal with situation arising out of air pollution caused by brick kilns in the NCR and also in the Mathura District. Order with regard to brick kilns dated 17.02.2021 in O.A. No. 1016/2019, Utkarsh Panwar v. Central Pollution Control Board & Ors., which has already been referred to in the earlier order dated 24.02.2021 wherein the Tribunal directed that the brick kilns in the NCR be regulated in the light of the carrying capacity in the interest of public health unless improved technologies used which doesn't adversely affect the air quality. The Tribunal held that may be it was a particular brick kiln maintained the standards was not enough if the air quality could not sustain such activities.

20. We may also refer to order of this Tribunal dated 01.12.2020 in O.A. No. 249/2020 whereby the Tribunal banned the fire crackers throughout India where air quality is poor and above in the interest of protection of public health. ***Extract from order dated 1.12.2020 in OA 249/2020 is reproduced below:***

"18. .....If the air quality is 'poor' and above, it has been held by the Hon'ble Supreme Court in the table quoted in para 4 above that there is danger of heart diseases, respiratory illness and other serious health impact *even before Covid. Covid is going to further aggravate the situation and therefore atleast in areas where air quality is 'poor' and above, no bursting of fire crackers should be permitted in view of 'Precautionary' principle, to be statutorily enforced by this Tribunal under Section 20 read with section 15 of the National Green Tribunal Act, 2010.*

32. .....In view of above discussion, following directions are issued:

i. There will be total ban on sale and use of all kinds of fire crackers during Covid-19 pandemic in the NCR and all cities/towns in the country ***where the ambient air quality falls under the 'poor' and above category****.*

v. We further direct that the Air Quality Monitoring Committees (AQMC) in terms of order of this Tribunal dated

08.10.2018 in OA No. 681/2018[21] to coordinate with the District Magistrates.[22] for compliance of the above directions."

21. This Tribunal, vide order dated 17.02.2021 in OA 1016/2019, Utkarsh Panwar v. Central Pollution Control Board & Ors., considered the issue of permissibility of brick kilns beyond the assimilative carrying capacity in the NCR and in the light of the Expert Committee report. This Tribunal directed that brick kilns be allowed to operate only from March to June using Zig-zag technology only to the extent of such number of brick kilns as were found to be viable in terms of the carrying capacity.

22. In recent order dated 12.08.2021 in O.A. No. 93/2021, Mukesh Kumar Aggarwal v. Central Pollution Control Board & Anr., in the context of brick kilns in Mathura District, the Tribunal held:

"13. Applying the same principles, we are of the view that the brick kilns ought to be permitted to the extent of carrying capacity, correctly calculated, strictly as per consent conditions, siting criteria and other environment norms. When air quality standards are exceeded, only non polluting technology has to be followed. Existing guidelines have to be strictly adhered to. Precautionary principle has to be applied and non compliant activity stopped.

14&15…xxx……xxx……xxx
16. In view of earlier orders quoted above and discussion in paras 10 to 12, we are of the view that steps need to be forthwith taken to stop operation of brick kilns already found to be operating in violation of environmental norms till compliance by the State PCB in exercise of its statutory power, following due process of law, till compliance. This will include brick kilns not following consent conditions, operating in excess of carrying capacity, CPCB guidelines and orders of this Tribunal, and those violating siting guidelines. Necessary action be ensured within two months. At the same time, there is need for further study of carrying capacity, applying correct data and norms. Air quality monitoring equipments be installed in the concerned area and if online monitoring stations cannot be set up, easily available equipments be used to continuously monitor air quality. Stringent monitoring mechanism be put in place. Process of mechanically giving consents be reviewed by the State PCB in view of binding 'precautionary' principle. Public health needs to be given

[21] The said order is as follows:
"15. xxx xxx xxx
i. xxx xxx xxx
ii. The Action Plans may be prepared by six-member committee comprising of **Directors of Environment, Transport, Industries, Urban Development, Agriculture and Member Secretary, State Pollution Control Board or Committee of the concerned State**. The Committee may be called Air Quality Monitoring Committee (AQMC). The AQMC will function under the overall supervision and coordination of Principal Secretary, Environment of the concerned State/Union Territory. This may be further supervised by the Chief Secretaries concerned or their counterparts in Union Territories by ensuring intra-sectoral co-ordination."

[22] The District Environment Committee has been directed to be constituted by this Tribunal to prepare and execute District Environment Plan vide order dated 15.07.2019 in OA No. 710/2017, Shailesh Singh vs. Sheela Hospital & Trauma Centre, Shahjahanpur & Ors.

due preference to the need for establishment of brick kilns. Violators be strictly proceeded against by way of prosecution, recovery of compensation and preventing pollution. While determining carrying capacity, other sources contributing pollution loads may be factored in while considering concentrations of PM_{10} in microgram per cubic metre in addition to loads given in kgs. Further, mixing heights data may be referred from the nearest location of IMD station. It is also necessary to clarify reasons of high CEPI score (91.1) particularly for Air and remedial action plan."

23. In view of above discussions, we are of the opinion that in view of the report in the present matter that the carrying capacity in the area is negative i.e. the air norms are not being met, while benign activity not adding to the pollution can be allowed, polluting activity can be allowed only by ensuring that it does not add to the air pollution, by taking such stringent measures as may achieve desired result and may not adversely affect public health. Such measures may be use of appropriate technology, mitigation measures like dense forest shelter belts etc.

24. 'Sustainable Development' principle requires that the business activity should not compromise public health. This requires study of carrying capacity. In the present case, such capacity has been determined, though data considered is only of the month of June when air quality is comparatively better, compared to the winter months. Carrying capacity has not been assessed with reference to the average air quality for air quality of the months when air quality is comparatively inferior. The hot mix plants may operate even in winter, which are fast approaching. There is no justification in law for the recommendations that only new hot mix plants may not be allowed and the old hot mix plants may continue even at the cost of public health. Further, there is also no justification for the recommendation that the laid down siting criteria should apply only to new establishments. Already set up hot mix plants need not follow such criteria even if it results in damage to the public health and the environment. While the report with regard to the study can be considered for further action, the recommendations which are not in accordance with the environmental law cannot be accepted.

25. While we have no option except to enforce the environmental norms and stop hot mix plants not sustainable due to lack of carrying capacity, we are mindful of difficulty which will arise not only for the operators of such plants but also those who need such services. While GRAP is already operative which results in closure of certain polluting activities on deterioration of air quality, to maintain air standards further restrictions on polluting activities are necessary in the interest of public health. At the same time, ways and means need to be explored to sustain such activities to the extent possible without adversely affecting the public health. Since PM concentrations in the Central Indian/ Indo-Gangetic Plains are higher compared to Southern and East and North-Eastern parts of the country, to maintain regional balance in Developmental and industrial activities throughout the country and to support economy as well as the need of public, it is necessary that better technological options and advanced air pollution abatement measures are explored which enable sustainability of such activities. For this purpose, we constitute a seven member joint Committee which

will have statutory authorities and subject matter experts to look into the issue and to give science-based expert report. The Committee will comprise MoEF & CC, CPCB, State PCB, District Magistrate, Prof. Mukesh Khare, IIT Delhi, Prof. Mukesh Sharma, IIT Kanpur and Prof. Shiva Nagendran, IIT Chennai. Proceedings may be steered by the Member Secretary, CPCB. The Committee may adopt any other expert Institutions or individuals of repute. It may give its report in three months. Pending this report, UP PCB not to allow non- compliant hot mix plants in terms of GRAP and the present carrying capacity study report.

26. Thus, we direct as follows:-

i. The hot mix plants beyond carrying capacity may be closed at the earliest and as far as possible from 01.11.2021 by the statutory regulators in exercise of their jurisdiction under the Air Act, 1981 and the EP Act, 1986. In other words, no hot mix plant – old or new may be allowed beyond carrying capacity and without compliance of the laid down siting norms from 01.11.2021.

ii. ***A joint Committee comprising MoEF & CC, CPCB, State PCB, District Magistrate, Prof Mukesh Khare, IIT Delhi, Prof Mukesh Sharma, IIT Kanpur and Prof Shiva Nagendran, IIT Chennai may give a report in terms of para 25 above within three months*** *by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF."*

6. In light of above, report dated 30.01.2023 has been filed. It is stated that in view of air pollution in Indo-Gangetic Plain (IGP), development activities can be only with advance technology and management interventions, particularly during October and November. Sector specific recommendations have also been made with regard to domestic, transport and industries sectors along with enforcement strategies.

Our analysis:

7. We have given anxious consideration to the matter. We see the point in the report that prevailing situation in IGP calls for interventions in controlling and regulating unsustainable activities which may deteriorate the situation and adversely affect public health. There is exceedance of PM 2.5 during winter season taking the air quality to

'Severe' category. Apart from meteorological conditions, behavior and dispersion of pollutants particularly PM 2.5., there are contributors from other sources shown by the emission Inventory. The Committee has suggested three stage approach – (i) use of cleaner fuel, (ii) adopting efficient pollution control technologies and (iii) regulating operations as per Graded Response Action Plan (GRAP). The Committee has listed out Hot Spot Districts having poor air quality as follows:

"Table 5: List of Hotspot District with in IGP region

District	***State***
Aligarh	*Uttar Pradesh*
Kanpur	*Uttar Pradesh*
Faridabad	*Haryana*
Gautam Buddha Nagar	*Uttar Pradesh*
Mathura	*Uttar Pradesh*
Palwal	*Haryana*
Bulandshahr	*Uttar Pradesh*
Etah	*Uttar Pradesh*
Mahamaya Nagar	*Uttar Pradesh*
Kansiram Nagar	*Uttar Pradesh*
Baghpat	*Uttar Pradesh*
Ghaziabad	*Uttar Pradesh*
Meerut	*Uttar Pradesh*
Muzaffarnagar	*Uttar Pradesh*
North	*NCT of Delhi*
North East	*NCT of Delhi*
North West	*NCT of Delhi*
Panipat	*Haryana*
Sonipat	*Haryana*
Bhiwani	*Haryana*
Hisar	*Haryana*
Jhajjar	*Haryana*
Rohtak	*Haryana*
Central	*NCT of Delhi*
East	*NCT of Delhi*

New Delhi	*NCT of Delhi*
South West	*NCT of Delhi*
West	*NCT of Delhi*
South	*NCT of Delhi*
Gurgaon	*Haryana*
District	*State*
Mewat	*Haryana*
Firozpur	*Punjab*
Muktsar	*Punjab*
Sirsa	*Haryana*
Firozabad	*Uttar Pradesh*
Bardhhaman	*West Bengal*
Birbhum	*West Bengal*

8. Relevant extracts from the report are as under:-

"2.2.3 Analysis of Ambient Air Quality Data

xxx……xxx……xxx

The data for year 2019 is selected for representation of air quality status in IGP plain, the data for years 2020 and 2021 can cause biasness in our analysis due to Covid 19 pandemic and lockdown periods in both years. The data for year 2019 will be more representative for analyzing the air quality trends in IGP. The data for year 2019 is collected from CPCB air quality data management portal (https://app.cpcbccr.com/ccr/#/caaqm-dashboard-all/caaqm-landing). The seasonal variation of the PM levels is done based on seasonal bifurcation given by Sharma et al., 2021; Kumar et al., 2017. There are four major seasons Winter (Dec-Feb), Summer (Mar-May), Monsoon (Jun-Aug) and Post-Monsoon (Sep-Nov). The analysis of the collected data for seasonal variation is done on the basis of this bifurcation.

2.2.4 Identification of PM hotspots using satellite observations

The research employed satellite-based PM2.5 exposure calibrated to ground-based observations. Moderate Resolution Imaging Spectroradiometer (MRIS) data were used to determine surface PM2.5 concentrations (MODIS). MODIS can recover AOD at 10-km, 3-km, and 1-km spatial resolutions. In this study, we used the Multiangle Implementation of Atmospheric Correction (MAIAC) technique to recover AOD at 1-km resolution and converted it to PM2.5 using geographically and temporally changing scaling factors (i.e., PM2.5/AOD) from MERRA-2 data. The MERRA-2 scaling factors were compared to ground- based observations of CPCB locations. MERRA-2's diurnal scaling factor (i.e., the ratio of 24-hr PM2.5/PM2.5 during the satellite overpass) was used to transform

the satellite-derived instantaneous PM2.5 to 24-hr average PM2.5 (Joshi et al. 2021). The satellite-derived daily (24-h average) and annual PM2.5 show a R^2 of 0.8 and 0.97 and root mean square error of 25.7 and 7.2 µg/m^3, respectively against surface measurements from the Central Pollution Control Board India network. More details about the retrieval of PM2.5 from satellite data, calibration, and validation are available in (Dey et al. 2020). The satellite derived PM2.5 product is accessible from our data portal (www. saans.co.in)."

"3.1 Seasonal Variation of PM2.5 in IGP

xxx……xxx……xxx

Table 3: Seasonal Variation of PM2.5 (in µg/m^3) in IGP

Site	***Winter***	***Summer***	***Monsoon***	***Post-Monsoon***
Amritsar, Punjab	*53*	*52*	*35*	*64*
Murthal, Haryana	*85*	*73*	*59*	*58*
New Delhi (ITO)	*176*	*87*	*51*	*125*
Lucknow, Uttar Pradesh	*119*	*83*	*37*	*87*
Patna, Bihar	*208*	*66*	*37*	*116*
Kolkata, West Bengal	*175*	*64*	*38*	*66*

"3.2 Annual & Diurnal Variation of PM2.5 in IGP

xxx……xxx……xxx

The weekly diurnal variation plots for sites across IGP shows that the concentration of PM2.5 is lowest during the day between 12:00-18:00 hrs, after 18:00 hrs the concentration of PM2.5 starts increasing and peaks around midnight. During night hours (0:00-06:00_ the concentration of PM2.5 does not show much variation. Between 6:00-12:00 hrs, the concentration shows variation due to morning peak hours, the peaks are generally observed between 08:00-10:00 hrs and afterwards the PM2.5 concentration keeps decreasing till 18:00 hrs."

"6.1 General recommendations for non-industrial sectors to control the emission

6.1.1 Domestic Sector

The domestic sector contributes nearly 437 Gg of PM2.5 (19 % of the total PM2.5 emission) per year over the IGP. This emission is primarily due to the use of solid fuel and traditional Chulha in rural locations. In a highly populated country like India, giving subsidy in each individual household might not be feasible. But the rural and partly some semi urban and urban population are unwilling to use cleaner fuel (LPG) instead of free or less costly solid fuel. Hence, promoting the cleaner fuel through Pradhan Mantri Ujjwala Yojana and providing support to the economically weaker section like BPL

ration card holders should be considered. During critical winter months (November and December), if the families using solid fuel only (estimated number of families 3,60,75,200) use domestic LPG (estimated 7,21,50,401 number of domestic LPG cylinders required @two cylinders per family during the season), 108 Gg of net PM2.5 emissions can be reduced over the IGP. Another solution to control the domestic emission might be promoting improved cook stoves in the rural areas. Providing one improved cook stove can run for one or two years for a family and this can significantly reduce the emission from the domestic solid fuel burning. Cattle dung can be used as an alternative of coal in nearby coal-based industries with high PM2.5 control efficiencies and provide some financial benefit to the rural population.

6.1.2 Soil and Dust

All source apportionment and inventory studies in the region show overwhelming impact of dust especially during summer that is inevitable in these geo-climatic conditions. The net emission of soil and road dust is 225 Gg/year (~10 % of the total PM2.5 emissions over the region). Loose crustal soil and high wind effect in the Indo-Gangetic Plain contribute to this phenomenon. Dry winters/summers add to the problem. Re-suspension of road dust due to vehicular traffic is of special concern. Dust is a carrier of toxins from combustion sources and therefore, can be harmful. However, the strategy to address this problem has to be diverse and not limited to only road cleaning and sweeping. A lot of this problem is also created by mismanaged urban construction and roads. Intense rapid action should be taken to repair and building of pavements and vacuum cleaning of roads; implementation of street design guidelines for footpaths and cycle tracks with adequate vegetative buffers and paving of roads; blacktopping/ pavement of road shoulders; phase-in mechanical/ vacuum based street sweeping' introduce wet/ mechanized sweeping of roads; implementation of truck loading guidelines; use of appropriate enclosures for haul trucks; gravel paving for all haul routes; sprinkling of recycled water; water fountains at major intersections; maintenance of pothole free roads, increase in green cover on central verges and on the road sides along the right of ways, enforcement of air pollution control in concrete batching (use of water spray and wind breakers, bag filters at silos and enclosures, hoods, curtains etc.)

Towards dust management on roads and road construction projects, municipal bodies should adopt the road dust control measures. The focus should be largely on the maintenance of roads, identification of hotspots for road dust, mechanical sweeping, sprinkling and scientific disposal of collected waste. The longer-term systemic changes should require more broad-based approaches: (i) Municipal ward wise street network redevelopment plan for paving and greening as per IRC guidelines without impeding the needs of other road users including pedestrians. (ii) Hotspot action for road cleaning with GPS enabled mechanical sweepers; desilting of canals/nullah's side roads brick lining, dedicated helpline with MIS support and citizen interface to enable geo-tagging for complaints; (iii) Urban greening agenda with greening of open areas, gardens, plantation for green walling and protection of all forest areas in IGP.

The exclusive controls of urban dust should include better road conditions, paved shoulders, stabilization of soil surface, sidewalks, and unpaved portions (e.g., parking lots) to have Interlocking Concrete Block Pavement (ICBP) in the megacities over IGP. ICBP technology should be adopted for specific requirements of footpaths, parking areas, etc. It should be the priority that all existing unpaved shoulders, sidewalks, and parking lots are suitably handled and, in the future, all new road constructions incorporate these measures.

All major urban roads, State Highways and NHAI must maintain silt load of 2.0 g/m^2 or less on their roads and assess the silt load twice in a year (winter and summer) at an interval of 50 km on both sides of the road.

Railway siding should construct warehouse for storage of cement bags or other dusty material to minimize fugitive emissions during loading, unloading and storage and avoid these operations on open platforms. Mechanical handling of bags of cement or dusty material be done using conveyor belts, possibly horizontally movable belts. Enclosures in the form of flexible belt curtain may be provided on the warehouse openings used for transfer of material. Warehouse cleaning shall be done with only mechanical means (large size vacuum pump) and it shall be done on regular basis. Cement collected shall be properly stored and records be maintained. Peripheral roads for vehicle movement should be paved and these should be properly maintained.

6.1.3 Construction dust

Construction work all through the country is progressing at a fast rate and as the economy grows, it will further increase. The production of cement, along with poor conditions at the construction sites, are responsible for significant contribution in PM2.5/10. Regulations are adequate but enforcement of these needs to be strengthened (e.g. shielding off the construction sites, storage of materials, loading-unloading, paved road at the construction site) and dust from the construction work. Uses of water cannon to wash the surrounding may be partly useful but what is important is to prevent dust emissions. A condition/policy should be formulated that all building materials and surroundings (except raw cement) will have 2% moisture; this approach will solve the dust problems to a large extent.

6.1.4 Open Burning

This sector emits nearly 358 Gg PM2.5 annually (As per the EI report done in this study by IIT-Kanpur) (15.5 % of the total emission of PM2.5 over this region) and need to be addressed comprehensively. The following are some recommendations.

Crop residue burning

Our results have clearly shown that the major fraction of open burning is due to the crop residue burning. For the IGP, we cannot settle the issue of episodic air quality unless we talk about crop residue burning (CRB) in Punjab and Haryana; the estimated PM2.5 emissions from CRB is 70 Gg at the end of Kharif season is almost three times more than the Delhi's annual estimated emission. Thus,

the large CRB emission have paramount impact on the entire IGP. Plan of actions need to be taken well before and implemented. Continue with all efforts to minimize the number of CRB fires through technology, education, awareness, incentives and limit the mean number of daily fires to less than 1000 (refer to CII-NITI Aayog, 2018). Make all efforts at Block/Panchayat level to educate households not to burn any biomass including dung, encourage and promote LPG usages particularly during this period. Implement GRAP (Annexure - V) fully from October 15 to November 20 and not wait for PM2.5 levels to go above 250 µg/m^3. The GRAP has all the actions that will improve the air quality and reduce the emission to desired levels. But these actions are to be taken from October 15 to November 20, regardless of air quality in this period.

Municipal Solid Waste Burning

MSW is the major cause of air pollution not only because it is burned but also because of its improper disposal. The dumped MSW undergoes decomposition which releases H2S, NH3 and harmful volatile compounds like VOCs. The VOCs turn into particles of secondary organic aerosols and add in the formation of ozone. Although there exist MSW disposal Rules, their implementation is far from satisfactory in most urban areas.

The Cl- content, which is an indicator of MSW burning, in urban areas can vary 2-10 percent in PM10. The typical contribution of MSW burning alone is about 8-10 percent and it needs to be controlled.

Any form of garbage burning should be strictly stopped and monitored for its compliance. It will require the development of infrastructure (including access to remote and congested areas) for effective collection of MSW and disposal at the scientific landfill site. Space constraints force the municipal corporations to simply dumped and spread at the low lying area. This must be recognized that the major problem is that of collection. The option of waste to energy plants must be considered with very high pollution control; PM control over 99.99 percent should be ensured. A similar treatment/ disposal of legacy waste should also be taken up on priority.

The municipal corporations should prioritize the MSW collection mechanism starting in a systematic manner in each ward. Special attention is required for fruits, vegetable markets and commercial areas and high-rise residential buildings, where MSW burning is common. A mechanism should be developed to carry out the mass balance of MSW generation and disposal on a daily and monthly basis. These data must be inventorized and available for public scrutiny.

Desilting and cleaning of municipal drains by Municipal Corporation should be undertaken on a regular interval, as the silt with biological activities can cause emission of air pollutants like H2S, NH3, VOCs, etc. It is seen that waste is sometimes burned in industrial areas; this must stop and be ensured under the supervision of industrial development agency and pollution control boards. The complete banning of MSW burning in urban areas can significantly reduce PM2.5 emissions.

Open burning of waste as well as spontaneous fire in landfills contribute substantially to air pollution and is a source of high toxic exposure for local communities. The enforcement measures that include ground inspection and penalty and emergency response to public complaints have limited impacts. The effective solution lies in proper waste management. However, infrastructure for waste collection, transfer, material recovery and safe disposal is not adequate. As a result, waste accumulates in the open that is burnt for easy disposal. Waste management has to ensure proper quantification of waste generation, 100 % door to door collection of segregated waste, material recovery and recycling and minimize fresh dumping of waste in landfills and full remediation of legacy waste.

6.1.5 Transport Sector

The contribution of particulate matter from the transport sector is relatively low compare to industrial or domestic sector as a whole (118 Gg/year, i.e., 5 % of the total PM2.5 emission over the region) (As per the EI report done in this study by IIT-Kanpur). But in point locations such as over the urban agglomeration the relative contribution from transport sector could quite high. According to the Automotive Research Association of India, due to the progressive tightening of the emissions standards for vehicles there has been substantive improvement in tailpipe emissions from new vehicles. With graduating from Bharat Stage-I (BS-I) to Bharat Stage - VI (BS-VI) emissions standards, particulate emissions from diesel cars have reduced 31 times and from heavy duty vehicles by 36 times. While new vehicle technology and emissions control systems have significantly improved and will continue to improve to reduce tailpipe emissions in the driving conditions, equally stringent focus is needed on management of on-road vehicles. The objective is to keep on-road vehicles low emitting during their useful life on the road and to reduce direct exposure to toxic emissions; accelerate fleet renewal to leverage emissions gains from the technology advancement with introduction of BS VI emissions standards; and accelerate zero emissions transition with rapid electrification of targeted vehicle fleet to meet clean air target. Simultaneously, transportation and mobility strategies will be implemented to reduce vehicle miles travelled and achieve at least 80-85 per cent modal share by public transport systems.

There should be improvement in enforcement systems that include linking of updated PUC and Vahan database, automatic alert to vehicle owners for renewal of PUC certificates, compliance strategy like linking refueling with valid PUC certificate and higher penalty. Linking of PUC with annual vehicle insurance may be useful. Information on the status of action in IGP is not equally adequate. The programme requires uniform strengthening; quality control at a scale and effective fleet screening still remains a daunting challenge. This requires introduction of more advanced inspection and monitoring systems. In addition, all commercial vehicles require annual roadworthiness and fitness tests under Central Motor Vehicle Rules (CMVR). In most part of IGP these tests are done manually with limited testing facilities. There is a need to set up more fully automated high-capacity centralized testing centers for the region. There is scope for better capacity utilization of these testing centers. Vehicle electrification targets for IGP by each of the

States need to be set in terms of percentage of the new vehicle sales to be achieved by the end of the 2025-2030 in phased manner and also targeting total e-vehicles in particular categories. All States should have a policy on EV and hybrid vehicles, charging points at State/ private/ household level in a time bound manner. Implement older vehicle phase out policy as per the action plan of MoRTH for National Clean Air Programme (prana.cpcb@gov.in>> partners>>MoRTH plan). All new public transport buses in cities over this region should be targeted to be electric buses. Identification and decongestion of traffic intersections as per the approved city action plans could also lead to reduction in net emission from the transport sector.

Minimizing pollution from in-use old vehicles: *Among control devices, the Diesel Particulate Filter (DPF) is useful and proven technology. DPFs are porous ceramic honeycomb devices and filtration in DPFs occurs as exhaust gases are forced to flow through the walls and structure of filter. Such installation is possible in both BS IV two and four-wheelers. Every State should develop/amend vehicle scrappage policy, develop incentive mechanism for scrappage of old vehicles, and set up infrastructure for material recovery and disposal of end-of-life vehicles (Toyota operates one such plant in NOIDA). Develop a plan for CNG/CBG fuelling network in IGP and on highways to shift long haul trucking and other commercial vehicles to CNG.*

E-Mobility: *Policies on e-mobility for all the IGP states should have priority for million plus cities that encourage EV including strong hybrid vehicles.*

Faster EV adoption in intra-city commercial transport and in 2/3-wheeler segments should be ensured. Public city transport including taxis and cabs may be converted to gas/electricity or strong hybrid in a time-bound manner. Diesel auto rickshaws should be phased out. Strategic plan for EV charging infrastructure at each 3 km in urban areas, 25 km on highways (both sides) and 100 km for buses and trucks and swappable battery stations may be set up. Retrofitting of old and overaged petrol/diesel vehicles into electric vehicles.

City transport services (bus and metro services) should be augmented in million plus cities. Public transport can be made cheaper than the two-wheeler cost.

6.1.6 Fugitive emissions

There are several industrial enterprises that are responsible for huge amount of fugitive emissions and dust generation from mining and different phases of crushing and storage. Stone crushers and mineral grinding are the most prominent among them. It is necessary to further reform the industrial structure, modernize production capacity with improved emission control systems and adoption of clean fuels like natural gas and clean electricity for industrial applications. This will have to be supported by smart monitoring and deterrence for compliance and targeted improvement. Other requirements are installation of ambient air quality monitoring stations and online e-Rawaana system to stop illegal mining. These require proper implementation and effective

technical approach. Also, further mapping of all sources of fugitive emissions is important.

Construction work all through the country is progressing at a fast rate and as the economy grows, it will further increase. The production of cement, along with poor conditions at the construction sites, result in contamination and pollution. Regulations are adequate but poor implementation of dust control measures (e.g., shielding off the construction sites, proper storage of materials, loading-unloading, paved road at the construction site) may lead to dust from the construction work. Uses of water cannon to wash the surrounding may be partly useful but what is important is to prevent dust emissions. A condition/policy should be formulated that all building materials and surroundings (except raw cement) will have 2 % moisture; this approach should solve the dust problems to a large extent.

CPCB has brought out guidelines for prevention and control of dust from construction activities. State agencies must implement these in later and spirit.

6.1.7 Agriculture Sector

The rural emissions are significant and need to be controlled on priority. The control of rural emissions will improve the air quality in rural area and prevent its contribution to urban areas in the form of background pollution. In rural area tillage from the agricultural land is an important source of PM2.5. Use of solar pump can be encouraged for the irrigation purpose in place of diesel or kerosene.

Ploughing should be avoided if the soil is dry and there are high winds. Minimize soil-disturbing field operations such as ploughing, mowing, and tilling. These activities may be avoided when winds are high. Post-harvest tillage may be done on low wind speed days-based weather forecasts. Physical barriers such as fences, straw bales, and large trees may be used to minimize the flow of dust.

6.2 Industry Specific Interventions (Best Available Technology and stringent emission standards)

This study shows that the industrial sectors are the main PM2.5 emitters over the IGP region with the net emission of 1128 Gg/year (48 % of the total PM2.5 emission) (As per the EI report done in this study by IIT-Kanpur). Hence this sector needs special attention and planning for air quality management. Emission Inventory for Industrial emission of PM2.5 shows that in IGP, Uttar Pradesh is the major emitter of industrial PM followed by Bihar, West Bengal, Haryana and Punjab (Figure 34).

Net industrial emission of different states

Haryana= 133.2 Gg/Year

Punjab= 121.2 Gg/Year

Uttar Pradesh= 492 Gg/Year

Bihar= 208 Gg/Year

West Bengal = 191 Gg/Year

Brick Kilns

Among the industrial emission, the bricks have the largest contribution in IGP with the net emission of 468 Gg/year (41 % of the total industrial emission and 19 % of the total PM2.5 emission) (As per the EI report done in this study by IIT-Kanpur). State-wise emission inventory of PM2.5 shows that Brick Kilns contribute maximum to PM2.5 levels in Uttar Pradesh (230 Gg/year) and Bihar (77 Gg/Year) while the other major emitting States are Punjab (69 Gg/Year), Haryana (49 Gg/Year) and West Bengal (43 Gg/Year). Therefore, it is prerequisite to curb Brick kilns' emissions using latest technology.

Brick kilns are small scale and widely dispersed and are difficult to monitor. There have been several efforts to monitor their operation, set emission standards, mandate adoption of improved zig zag kiln technology and closure during winter in NCR. The MoEFCC has issued a gazette notification on February 22, 2022, on emissions standards and kiln technology. This provides for tighter particulate emissions standards, and specification of stack height by capacity of brick kilns. In intermittent kilns, bricks are fired in batches; fire is allowed to die out and the bricks are allowed to cool after they have been fired. The kiln must be emptied, refilled and a new fire has to be started for each load/batch of bricks. In intermittent kilns, most of the heat contained in the hot flue gases, fired bricks and the kiln structure is thus lost. Intermittent kilns are still widely used in several States of the IGP and can be further sub-divided into two categories: – Intermittent kilns without stack: The kilns which do not have any stack/chimney to guide the flue gases. In these kilns the flue gases can be seen coming out of the kiln from the sides or from all over the top surface of the kiln. Clamps, scove and scotch kilns are the examples of intermittent kilns without stack. This kind of kilns should be strictly banned over the region within next 3 years. All new brick kilns will be allowed only with zig zag technologies or vertical shaft or on piped natural gas. In addition, it is recommended that the brick kilns should be operative after the annual episodic issues of poor air quality (i.e., end of November) over Punjab and Haryana. For vertical shaft kilns the stack height should be 16m and 14m respectively for the Kiln capacity less than 30,000 bricks per day and more than 30000 per day. For rest all kind of kilns it should be 27m and 24m respectively. Brick kilns shall construct permanent facility (port hole and platform) as per the norms or design laid down by the Central Pollution Control Board for monitoring of emissions. Brick kilns should be established at a minimum distance of 0.8 kilometers from habitation and fruit orchards. State Pollution Control Boards/Pollution Control Committees may make siting criteria stringent considering proximity to habitation, population density, water bodies, sensitive receptors. The first step is to identify the type of technology used in existing brick kilns. Table 9 shows types of Brick kilns in use in IGP with their specifications.

Table 9: Types of Kilns used in IGP with their specifications

Type of Kiln	***Fixed Chimney Bull Trench Kiln (FCBTK)***	***Natural Draught Zig Zag***	***Induced Draught Zig Zag***	***Vertical Shaft***
Commonly used Fuel	*Coal Biomass: Sawdust, firewood, biomass briquettes Agricultural residue: husk and stalks Industrial waste: tires, plastic*	*Similar*	*Similar*	*Coal*
Specific Energy Consumption (MJ/kg)	*1.1-1.46*	*1.02-1.21*	*0.95-1.11*	*0.54-1.11*
Cause of Heat loss	*Incomplete Combustion, Heat loss from kiln surface*	*Heat Loss from kiln surface*	*Heat Loss from kiln surface*	*Flue gas and fired bricks*
Production Capacity (million Bricks per year)	*3-8*	*3-8*	*2.5-6.0*	*1.5-3.0*
Capital Cost (USD)	*50,000-80,000*	*50,000-80,000*	*50,000-80,000*	*60,000-80,000*
Good Quality Product	*60 %*	*85 %*	*80 %*	*90 %*

It is evident from the Table 9 that natural draught zig zag type of Brick kilns are the most efficient. Vertical shaft brick kilns are less polluting and their specific energy consumption is also low, however, with respect to capital cost and production capacity it is not viable.

Ministry of Environment, Forest & Climate Change has notified revised emission norms for brick kilns, which should be strictly enforced.

MSMEs

Micro Small and Medium Enterprises (MSME) are the major source of PM2.5 emissions in Bihar, Haryana and West Bengal while second major source in Punjab and Uttar Pradesh. Boilers and furnaces are the most common category of MSME in all States while stone crushers in Uttar Pradesh and Jute industries in West Bengal are also contributing (Table 10).

Among the industrial emission, MSMEs are the second largest (after brick kilns) contributor to the PM2.5 with the net emission of 350 Gg/Year which is about 31 % of the industrial emission and 14 % of the total PM2.5 emission over the region (As per the EI report done in this study by IIT-Kanpur). State-wise Emission inventory of PM2.5 shows that MSMEs contribute maximum to PM2.5 levels in Bihar (107 Gg/Year, 30 % of the MSMEs emission) and Uttar Pradesh (96 Gg/Year, 27 % of the MSMEs emission).

Table 10: State wise classification of leading MSME industries

State	***Type of MSME***
Bihar	*Boiler, Furnace, Roll Mills*
Haryana	*Boiler, Furnace*
Punjab	*Boiler, Furnace, Hot-mix Plants*
Uttar Pradesh	*Boiler, Furnace, Stone Crusher, Roll Mills*
West Bengal	*Boiler, Furnace, Roll Mills, Hot-mix plants, Jute*

The following steps can be taken to curb emissions from MSME.

Small scale units and small boilers

Small scale units dominate the industrial sector in the region and are largely dependent on polluting fossil fuels in their individual boilers. Such a system being energy inefficient on one hand, also are a source of high pollution. While several industry specific interventions to improve processes may improve overall technical efficiency for resources and emissions savings, it is necessary to focus on two priority strategies viz. access to clean fuel and replacement of small individual industrial boilers with common boilers, wherever possible. If feasible, such furnaces and industrial processes could also be run on affordable electricity. More than 50 % of the boilers installed in industrial areas are of less than 2 tones per hour (TPH) capacity. Another 35 % of boilers have capacity in the range of 2–10 TPH. These are used for generating steam for heating purposes. These boilers primarily consume coal and are presently not equipped with effective pollution control measures. Fuel feeding is mostly done manually without any automation and these have poor technical efficiency. Installation of any type of Continuous Emissions Monitoring Systems (CEMS) is not feasible. There are large number of small boilers in several industrial clusters in IGP. Replacement of small boilers with common boilers for steam generation in a cluster of industrial units is an important way forward. There are several advantages of switching from individual small boilers to common boilers. The individual industrial units can avoid a range of costs that include cost of installing small boilers and associated fuel cost, cost of air pollution control devices, operation and maintenance cost and can also avoid the need for getting environmental clearances for boilers. These costs and responsibilities can be borne by the manufacturers/installer and operator of common boilers. This can further reduce inspection requirements of numerous boilers by SPCBs. Common boilers can meet much tighter emissions standards, run on cleaner fuels including natural gas or biomass, adopt emissions control systems and CEMs monitoring and also obtain necessary environmental clearances.

Controlling emissions from the furnaces

There are many industries with induction furnaces, which is very polluting process, with almost no pollution control devices (Figure 35). The maximum emissions occur when the furnace lids and doors are opened during charging, back charging, alloying, oxygen lancing (if done), poking, slag removal, and tapping operations. These emissions escape from sides and top of the building. To address the pollution caused by fugitive emissions using induction furnaces a fume gas capturing device has been developed and commercially available. A side-based suction is far more effective than top suction, which interferes with the movement of the crane.

As efforts are being made to reduce pollution from boilers in industries, it is equally important to restrict the use of furnaces running on dirty fuels. Primarily manufacturing industries, especially metal-based industries, use furnaces. Currently these are largely operating on fuels like coal, wood and liquid fuel. However, several units have also adopted electric furnaces while a few are running on gas-based systems. While non-electric furnaces should not be allowed in new industries, a phase out plan may be planned for the existing industries with some incentive support for small and medium scale units. Until then ensure all industries using furnaces have installed well maintained air pollution control devices.

Induction furnace

There are several induction furnaces in IGP and these do not have proper collection of fumes and emission due to movement of cranes and almost all emission goes uncollected (Figure 36). The new technology requires the collection of emission from sideways but with much higher suction rate that does not interfere with the movement of crane and should be adopted (Figure 36).

Industrial waste burning

Nearly all industrial areas are prone to open burning of industrial waste that includes plastic, packaging, rubber, textile, ceramic, slag etc. Industrial waste management – both nonhazardous and hazardous waste - has emerged as an important issue in IGP States. There is an urgent need to streamline the collection and disposal of such industrial waste to prevent burning. Industries and industry associations should be made liable for safe collection and disposal. There have been some initiatives as in a few industrial zones where authorities have tied up with service providers to collect industrial waste and recycle and reuse using a material recovery facility. Such initiatives will have to be scaled up for the entire region.

CEMS monitoring in industries

Smart monitoring with the help of continuous emission monitoring (CEMS) is important for effective surveillance and transparent monitoring of industrial stack emissions to assess performance. The concerns regarding CEMS installation is quality control of data generated from the system. Lack of proper calibration and wrong installation, inadequate knowledge and skills required for technology selection, installation, operation and maintenance, compromise the quality of data and this needs immediate attention

and action. Also, vendors, industry, service providers lack proper knowledge/skills. Industries lack clarity on suitable technology selection. Suitability of technologies, according to type of stacks, issues related to auto drift, span check etc., or provision of remote calibration of equipment, quality assurance and periodical check of CEMS performance also need to be addressed. There is an urgent requirement to strengthen the CEMS regime so that it can be used as a compliance monitoring tool by the regulators. CPCB has already initiated steps in this regard. Quality data and robust management of data from CEMs is desirable to adopt market-based mechanism like emission trading system.

Sugar Industry

In IGP, sugar industries located in Uttar Pradesh and Punjab are the major contributors to PM emissions. In Uttar Pradesh sugar industries contribute to 16% of PM emissions while in Punjab it is around 5%. Figure 37 shows that in Uttar Pradesh most of the sugarcane industries are in the northern region.

Most of the Sugar Industries use bagasse as a fuel in boilers, which produces particulate matter, oxides of nitrogen, carbon, sulfur and water vapors. It has been observed that nearly 45-50% of the Sugar Mills (<1000 tons cursed per day) in this region is small scale sugar manufacturing company (Khandsari) and should be treated as MSMEs. They should shift to forced draft from current practice of natural draft for better combustion and install simple air pollution control devices like cyclones and multi-clones.

For the bigger mills (>1000 tons crushed per day), the particulate matter, usually referred to as fly ash, consists of ash, unburnt bagasse and carbon particles. The MoEF&CC has provided emission standards for sugar industries which has to be stringently followed.

They should install advance air pollution control devices like bag filters, scrubbers and ESPs and should meet the emission standard of 150 mg/m^3.

Coal based Power Plants

Emissions from coal power is also a significant source of PM2.5 in most of the States in IGP ranging from 12-16 % while in West Bengal it is one of the primary sources of PM2.5 (36 %). Revised emission norms for Coal Power Plants should be implemented within the specified time frame.

Cement Industries

The point source emissions from the cement industry include dust/particulate matter and gaseous emissions. Cement industry deals with various size reduction operations from limestone crushing to clinker grinding, dust emissions are a major pollutant. Gaseous emissions such as sulfur dioxide (SO2), oxides of nitrogen (NOx), carbon monoxide (CO), carbon dioxide (CO2), etc., are generated during pyro processing. The major sources for particulate matter emissions are crusher, coal mill, raw mill, kiln, clinker cooler, cement mill and packing plant.

Cement plants are equipped with air pollution control equipment (APCEs) like electrostatic precipitators (ESP), baghouse with glass

fiber membrane filters and ESPs modified with bag filters, called hybrid filters. The CPCB norms for fugitive dust control should be strictly followed.

Summary – industry specific

In IGP, industrial PM2.5 is primarily emitted by Uttar Pradesh followed by Bihar, West Bengal, Haryana and Punjab. Delhi and Chandigarh are comparatively negligible. In all IGP States four major industries have been identified viz. brick kilns, MSME, sugar and coal-based power plants. The study identified a work plan to be followed to curb emissions from different categories of industries. The first step should be usage of cleaner fuel. Nowadays, in brick kilns, scraps and plastic wastes have been in use which should be replaced by PNG and agricultural waste. Furnaces and boilers should use PNG, electricity and low sulfur coal. The most of the sugar mills are using bagasse fired boilers. Second step should be replacement of old technologies with new, for e.g., FCBT kilns should be replaced by zig-zag technology. Third step is to utilize pollution control technologies. Various types of PM controlling technologies have been identified which can be adopted as per requirement. Electrostatic precipitators and filters bags are the most efficient technologies for the finer particles, while for NOx and SO2 selective catalytic reduction and flue gas desulfurization are the most efficient methods. The last step is periodic assessment of emissions from stacks and stack height. Industries should follow the emission standards prescribed by MoEFCC. It is recommended that over the identified hot spots of industrial pollution PNG supply network should be started to shift towards the cleaner fuel. No new red category industries should be allowed within 5km radius where population is above 1 million."

Chapter 7 which refers to Summary of Actions and Recommendations are reproduced below:

Pursuant to the order of the Hon'ble NGT, the Committee has investigated the causes of high air pollution in IGP and made a detailed district-wise emission inventory of fine particles (PM2.5) for different emitting sectors. This has enabled the identification of regions of poor air quality and local hotspots where air quality is very poor. Industrial development is the backbone of economic progress; however, the growth should be sustainable with a low emission trajectory for better public health. The Committee has specifically concluded the requirements of advanced technology and management interventions for air pollution sources in IGP. Due consideration was given that technological options and other actions are realistic and time-worthy for air quality improvements without any major recommendation of closure or restriction on economic activities. In addition, specific action plans are also suggested for the October -November episodic air pollution observed in IGP. The Committee has proposed overall recommendations which may be implemented in a time-bound manner. The detailed sector-wise emission control measures are presented in Chapter 6 and specific recommendations are condensed in this chapter.

7.1 Specific Recommendations

Action plans for non-attainment cities for various sectors/activities are already prepared. These include short, medium and long-term actions for abatement and control of particulate matter emissions from transport, industry, domestic, agriculture, construction and demolition, road dust, genset and power sectors. These plans should be implemented aggressively, and various guidelines and norms enforced strictly. The Committee, in addition to the above, suggests the following sector-wise recommendations.

Domestic Sector

(i) A program for switching over from solid to cleaner gaseous fuel for domestic sector should be formulated and implemented in a time-bound manner. The plan may include expansion of LPG network and putting up Compressed Biogas (CBG) network using biomass such as crop residue, dung, wet organic municipal waste, etc., particularly in rural areas. To deal with high air pollution levels in critical winter months, feasibility of distributing two domestic LPG cylinders free of cost or on subsidized rate among the BPL families may be examined.

(ii) Promotion and rapid distribution of government-approved improved cook stoves in rural areas and among the urban road-side shanties.

(iii) Make all efforts at Block/Panchayat level to educate households through anganwadi workers and ANM nurses not to burn any biomass including dung and encourage and promote LPG usages.

Transport Sector

(i) All the diesel city public transport should be phased out completely in next five years, and city transport should be operated only through metro, e-vehicle or on CNG. All new public transport should be CNG or electric buses.

(ii) Public transport to be strengthened with metro and/or adequate number of buses, route plan based on commute surveys and Mobile App based ticketing and seating system is developed in all major cities.

(iii) Public transport can be made cheaper than two-wheeler cost.

(iv) Adequate vehicle scrappage infrastructure should be developed in next three years. Extended Producer Responsibility (EPR) may be considered for vehicle manufactures, who will have to build required vehicle scrap plants.

(v) Incentivise and aggressively implement e-mobility including required charging infrastructure. Strategic plan for EV charging infrastructure at each 3 km in urban areas, 25 km on highways (both sides) and 100 km for buses and trucks and swappable battery stations.

(vi) Linking of PUC centres with remote server and elimination of manual intervention in PUC testing.

(vii) Use off-peak passenger travel times to move freight (within the city) and restrict the entry of heavy vehicles into cities during

6:00 am to 9:00 pm in winter and 6:00 am to 10:00 pm in other seasons.

(viii) *Check Overloading: Use weigh-in-motion bridges/machines (WIM) and Weigh bridges at entry points to the city and at toll plaza to check the payload of commercial vehicles. As per CMVR, a penalty of 10 times the applicable rate for overloaded truck is applicable.*

(ix) *Prepare plan for improvement of infrastructure for decongestion of roads.*

(x) *Prepare and implement zonal plans to develop an NMT (non-motorized transport) network*

(xi) *Proper road maintenance and marking, smart traffic signaling, encroachment-free roads, the standard design of the speed breakers, speed warnings and traffic discipline should be enforced for emission reduction.*

(xii) *Poor quality lubricants and their inappropriate recycling is important cause of real driving emissions. The quality of lubricants should improve and recycled unorganized sales of the lubricants should be stopped.*

(xiii) *EVs should be aggressively promoted. However, till the time battery-EVs take over, strong hybrid electric vehicles (HEVs) that blend fuel and electric power are much more fuel-efficient and should be promoted.*

(xiv) *Control of particulate emission through gasoline particulate filter (GPF) is a new technology and can be adopted in new BSVI vehicles for reducing emissions in the near to mid-term period.*

Industry (Brick kiln, MSME, Induction Furnace, etc.)

(i) *All the industries must stop using solid and liquid fuel and switch over to cleaner source of energy viz. electricity, gaseous fuel or bio-mass, in a time-bound and phased manner (say five years). Industrial clusters having uncontrolled PM emission of 500 tons per day (equivalent to 100 MW coal power plant) may be taken up on priority. Such clusters should also become candidate for priority of PNG infrastructure.*

(ii) *In the industrial clusters, wherever feasible, common boilers (to supply steam) with adequate emission control measures may be installed, which will be a win-win option for industries and regulators.*

(iii) *Brick kilns should be converted to Zig-Zag technology. The revised norms notified by MoEFCC should be strictly enforced.*

(iv) *In induction furnaces new technology requiring collection of emission from sideways but with much higher suction rate that does not interfere with the movement of crane should be adopted.*

(v) *Small scale sugar mills (<1000 tons cursed per day) (Khandsari) should be treated as MSMEs. These should shift to forced draft from current practice of natural 77 draft for better combustion and install simple air pollution control devices like cyclones and multi-clones.*

(vi) *Technology upgradation must be targeted in MSMEs and adequately supported. Regular training program should be conducted for the skill development.*

(vii) Carry out pollution load estimation from industrial sector to enable setting of target for emission.

(viii) For MSMEs, a resource centre on technology-linked emissions achievements and multiple technology options and vendors (with the cost) linked to different levels of control be established at national and state levels; however, standards should be attained with the industry.

Open burning

Action plans for crop residue management are already in place for States of Haryana, Punjab, Delhi and NCR districts of Uttar Pradesh & Rajasthan. These should be implemented expeditiously. Every year, target and focus on at least five districts for zero crop residue burning in the States of Haryana and Punjab during post-monsoon.

Dust Control

(i) Identification and greening of open spaces, green cover on central verges and on the roadsides, repair and re-laying of pavements, grassing of road shoulders, washing and mechanical/vacuum-based street sweeping and proper disposal of collected dust must be ensured in cities and towns with more than 5 lakh population. Indian Road Congress/Bureau of Standards must bring out silt load standards for roads. All major urban roads, State Highways and NHAI must maintain silt load of 2.0 g/m^2 or less on their roads and assess the silt load twice a year (winter and summer) at an interval of 50 km on both sides of the road.

(ii) All the Railway Siding should construct warehouse for storage of cement bags or other dusty material to minimize fugitive emissions during loading, unloading and storage and avoid these operations on open platforms. Mechanical handling of bags of cement or dusty material be done using conveyor belts, possibly horizontally movable belts. Enclosures in the form of flexible belt curtain may be provided on the warehouse openings used for transfer of material.

(iii) Construction & Demolition (C&D) waste processing facilities of adequate capacities should be set up, to begin with, in cities having population more than 5lakh. C&D waste collection points must be created in different zones of the cities, and in no case, it should be allowed to be dumped in non-designated areas, particularly along roadside. Recycling of processed waste must be encouraged, facilitated and, wherever feasible, mandated.

Research & Development, Training and Capacity Building

(i) Focused research on IGP air pollution problems must be taken up, which can be coordinated through a dedicated Center/Cell established specifically for the purpose. The Center may collaborate with research & academic institutes and encourage/facilitate startups for developing affordable cleaner technologies (particularly for small scale polluting industries) and best process practices & guidelines for various air polluting sectors.

(ii) *Training and capacity building of regulatory agencies, urban local bodies, panchayats, industries must be taken up as a regular and important component to create skilled human resource.*

Enforcement and Administrative Issues

(i) *An independent body to better coordinate performance measurement among the Central, State and other agencies (e.g., Industry, Municipal Corporation) responsible for taking air pollution control measures as per the targets should be established. The sector-wise report, clearly stating air quality achievements and evaluate air program results should be published and available for public scrutiny.*

(ii) *The unorganized sectors should be facilitated to come on the mainstream within a specified timeframe and apply for consent under Air Act and meet emission standards.*

(iii) *The review of existing technologies, emission norms, guidelines, process practices, etc. should be taken up every three to five years for upgradation.*

(iv) *Hotspot districts (as per Table 5) must be dealt on priority for implementing various interventions/recommendations."*

9. We are satisfied that the report needs to be acted upon. It has articulated causes of air pollution scientifically and recommended sector-wise interventions. Recommendations in the report include setting up of an independent body in the MoEF&CC to monitor air control measures which is certainly the need of the hour. Identified Hotspot Districts need focused attention and continuous interventions. The existing technologies need have to be upgraded and unorganized sectors brought the main stream and also brought under the Consent Regime under the Air (Prevention and Control of Pollution) Act, 1981.

10. However, we find that the report has not covered the entire ground in terms of order of this Tribunal dated 09.09.2021. The Report has not given firm suggestions to deal with the pollution of existing industries in IGP and roadmap for the PCBs under the existing regulatory mechanism. Specific strategies for shifting to cleaner fuel and better technologies by revising conditions for Consents to Operate (CTO) have yet to be worked out in the light of data appearing in the report. More stringent strategies need to be followed for acknowledged polluting activities like hot mix

plants, beyond GRAP. This left over work may need to be now undertaken by the special monitoring cell under the MoEF&CC/CPCB which may be set up preferably within three months.

11. We have noted that *Civil Appeal Diary No(s). 30240/2021, Jagat Singh vs. State of Uttar Pradesh & Ors.* is pending before the Hon'ble Supreme Court against order of this Tribunal dated 09.09.2021. It will be open to the parties to file a copy of this order in the said pending proceedings to enable the Hon'ble Supreme Court to consider the same for any further order.

12. In the light of above, we dispose of the application with following **Directions:**

1) The report of the Joint Committee be hosted on the website of CPCB and circulated by the CPCB to PCBs/PCCs of IGP States/UTs within a fortnight.

2) The vulnerable districts mentioned in the report may be listed out as 'Air Quality Sensitive Districts' and polluting sources operating in these districts be closely monitored. Modified CTOs be granted in respect thereof with operational restrictions in the nature of GRAP, requiring switching over to cleaner fuel and adopting efficient air pollution control devices with definite time frame not exceeding six months.

3) MoEF&CC and CPCB may enforce requirement of cleaner fuel, switching over to efficient air pollution control technologies, enforcement of GRAP and vigilance measures to control other pollution sources like dust control, vehicular pollution and the like under the National Clean Air Program and require City and District specific action plans within six months by identified authorities/joint Committees

4) MoEF&CC and CPCB may further assess the status in different areas after review of Daily and Annual Ambient Air Quality data and take remedial measures on that basis within six months.

13. We place on record our appreciation for the efforts of the joint Committee which may be conveyed to its Members by the Member Secretary, CPCB. We have noted that the report is available on the NGT website and its copy may also be hosted on the CPCB website for reference by the stakeholders. MoEF&CC/CPCB may also forward the report to concerned Departments responsible for taking action on the recommendations including Ministry of Transport, Ministry of Petroleum, Ministries of MSME and Heavy Industries, and Chief Secretaries of concerned States i.e. Uttar Pradesh, Delhi, Haryana, Punjab and West Bengal.

14. CPCB may hold a meeting with all concerned Ministries, Departments, States, UTs and other stakeholders preferably within three months for preparing a road map for implementation of the recommendations.

The application is disposed of.

A copy of this order be forwarded to MoEF&CC, CPCB, Chief Secretaries of States of Uttar Pradesh, Delhi, Haryana, Punjab and West Bengal and Secretaries, Ministry of Transport, Ministry of Petroleum, Ministry of MSME, Ministry of Heavy Industries and Ministry of Home Affairs, Government of India by e-mail for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Dr. A. Senthil Vel, EM

March 27, 2023
Original Application No. 19/2021
SN