

## **Oddity of Managing Air Pollution in Delhi: Public Policy Myopia**

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### **Abstract**

Recent decision of the Government of Delhi to introduce odd-even formula entailing restrictive mobility for curbing vehicular pollution in the city has attracted phenomenal public outcry. From day one of 2016, citizens can drive their cars of odd or even numbers only three times a week except on Sundays when there is no bar. Such an extreme move of the Government aimed at improving air quality of the city is likely to cause tremendous inconvenience to the people who are forced to take private vehicles to their workplaces due to constantly overcrowded and inefficient public transport. Executive decision of the government is majorly inspired by judicial activism on environmental issues. However, the government has failed to discharge its role of working out public policy on the matter under pressure from the courts to undertake urgent measures to reduce level of air pollution which has crossed all limits for safe breathing. Unfortunately, odd-even formula, presented by the government as panacea, appears to be half-hearted and thoughtless intervention which at best reflects public policy myopia. This discussion paper tries to examine the root causes of the deteriorating air quality in the city and explore appropriate public policy options to let Delhi breathe without causing much trouble to the citizens.

**Keywords:** Air Pollution, Air Quality, Delhi, Public Policy

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*‘To choke on your own fumes is one of the worst travesties a nation could inflict upon itself’*

–Arun Purie, India Today, 28 December 2015

### **Introduction**

The Government of Delhi has decided to use a quick fix solution to resolve a long-standing issue of worsening air quality in the city under pressure from the court by restricting mobility of cars based on odd-even registration numbers on odd-even dates from 1 January 2016 –a move

intended to cut vehicle emission by half (Richardson, 2015). It has been observed in media that the government reacted to court's admonition that 'living in Delhi is like living in a gas chamber' –thus odd-even formula is a reaction plan rather than an action plan...without calling for the public debate and considering the pros and cons....(Suresh, 2015).

While every citizen of Delhi is concerned about rising air pollution that threatens survival, majority view is opposed to the government's knee-jerk reaction in implementing odd-even formula without much thought. We do not have definitive evidences regarding significant reduction in levels of air pollution by such experiments in the past in various cities such as Paris, Mexico City, Bogota, Beijing, etc. (Richardson, 2015; Pradhan, 2015). Besides, vehicular pollution is only a small contributor to hazardous air quality in the city as indicated by widely acclaimed research of Goel and Guttikunda (2015). Hence it is right time to look beyond short-term view of odd-even formula and make a concerted effort to understand the gravity of current scenario vis-à-vis air quality in Delhi, the root causes of air pollution and how it can be managed with a long-term perspective.

### **Unfolding 'Delhi as Gas Chamber' Metaphor**

Level of air pollution in the city has crossed the maximum limit which can be measured by Delhi Pollution Control Committee. According to a report published in India Today, 'a Delhi resident is today exposed to an average of 153 micrograms per cubic meter of PM 2.5 –the smallest and most harmful of all measurable particulate matter –which is 15 times higher than the WHO's recommended annual average (Pradhan, 2015). Probably this is the extreme scenario which prompted the Delhi High Court to declare the city as gas chamber. Media reports indicate that the level of hazardous particulate matter in air is 10-16 times higher than what is considered safe for human breathing.

No wonder, around 10,000 people die prematurely each year due to rising pollution level in the city (Speaking Tree, 2015). Various scientific studies suggest that long-term exposure to nitrogen oxide emitted by vehicles may decrease lung function and increase the risk of respiratory systems (Dash, 2015). Doctors associate high levels of suspended particulate matter and sulphur dioxide with increased mortality, morbidity and impaired pulmonary function as fine particulates penetrate the respiratory system and alter immune system, impair liver, cause brain damage in children resulting in lower IQ, hyperactivity and lower concentration (Pradhan, 2015).

Dev (2015) reports 'an eight-year study from 2008-2015, conducted by IIT Roorkee, University of Minnesota, US, and University of Surrey, UK has shown that emissions from vehicles in Delhi have increased up to three times between 1991 and 2011; these could rise by up to 19 times by 2020. Further, 'private vehicles' (two wheelers and cars) –carbon dioxide, hydrocarbons, PM 10, carbon monoxide, nitrogen oxide and toxic substances like butadiene, acetaldehyde, benzene, formaldehyde, total aldehyde and total poly aromatic hydrocarbons have increased by 2-13 times in 2011 2-16 times in 2015 over 1991 levels'.

'Comprehensive Study on Air Pollution and Green House Gases in Delhi' conducted by IIT Kanpur, indicates a very high levels of an extremely toxic group of 100 chemicals called polycyclic aromatic hydrocarbons (PAHs) emitted mainly due to incomplete combustion (Nandi, 2015). PAHs are carcinogen, mutagen and reproductive toxin which can affect lung function, cause chest pain, irritation and adversely affect reproductive system as a result of long term exposure (Nandi, 2015).

However, there are some contrary views that question rationality of 'Delhi as Gas Chamber' metaphor. Quoting a report of System of Air Quality and Weather Forecasting and Research (SAFAR), Bhosale (2015) observes

- Delhi's air is much cleaner than expected and significantly less polluted than last year;
- There is steady decline in the pollutants and the trend appears to be consistent;
- There are some evidence regarding a lowering of particulate matter, both PM 2.5 and PM 10 (PM 2.5 denotes fine, breathable particles while PM 10 refers to bigger and relatively less dangerous ones);
- Level of PM 2.5 settled at 129 microgram/m<sup>3</sup> which is –although still in very poor category –is significantly very low in number for cold weather (colder temperature normally tend to increase PM levels if winds are calm).

SAFAR report in no way approves the current level of air quality; it simply disputes the extreme comparison of Delhi with gas chamber. In fact the air pollution scenario is such that warrants long-term strategy rather than quick fix solution which can provide only short-term gains. Hence it is worthwhile to explore long term strategic options to redeem Delhi into a habitable city from proverbial gas chamber.

### **Misplaced Solution versus Long-term Strategy**

Government of Delhi has decided to implement odd-even plan (with a few exemptions) for restricting vehicular mobility in the city during 1-15 January 2016 in order to improve air quality (Lalchandani, 2015). The government has granted special powers to Delhi Police under the Motor Vehicles Act to impose fines for violations. However, the government depends on good sense of the citizens rather than penalty for success of the odd-even plan as observed by Chief Minister of Delhi: 'we can penalize only if there are just a few violators, if there are lots of violators and Delhites do not wish to be a part of this plan we will have to suspend it because we cannot fine everyone –such moves require a cultural change and we cannot force people' (Lalchandani, 2015). No wonder, the government has indicated that the plan, including set of exemptions, will be reviewed in due course (Lalchandani, 2015).

Interestingly, odd-even formula, which is presented as new-year gift for ensuring clean air in Delhi, covers only 20% of the vehicles under its ambit which in turn makes it difficult for the state to enforce the government order in true spirit (The Times of India, 2015 a, b). Centre for Science & Environment observed that overall impact of the effectiveness of the initiative has been compromised due to exemptions granted to two wheelers in general and other specific categories in particular in case of four wheelers (The Times of India, 2015 b). Indeed, number of

two wheelers in Delhi (51 lakh of 89 lakh vehicles registered in Delhi) causes serious concern although they are a bit less dangerous than vehicles run on diesel (The Times of India, 2015 b, c). Exemption announced by Delhi government's odd-even vehicle plan has diluted the measure and may not meet the goal of significantly reducing air pollution (Lalchandani, 2015, The Times of India, 2015 b).

Further, two wheelers in particular, are responsible for about 33% of particulate matter emission in the transport sector, second only to trucks (The Times of India, 2015 b). A two wheeler in India emits nitrogen oxide equivalent to the emission from four or five petrol-powered cars because of the leniency in standards set by the government (Dash, 2015). Dev (2015) reports 'two wheelers were found, at present, to be the dominant source of emissions of what are termed as Mobile Source Air Toxics –formaldehyde (37%), hydrocarbons (35%)' while 'private cars were found to be responsible for major part of the carbon monoxide (34%), benzene (48%), and total aldehyde (40%) emission' and 'heavy-duty commercial vehicles were found to have emitted nearly 46% of all particulate pollutants in 2015' as compared to 'diesel cars which were responsible for 10% of such pollution in Delhi'.

Implementation of odd-even formula for reducing air pollution is supposedly not based on any scientific study but common sense and political judgement taking cue from some past instances. In fact, IIT Kanpur which submitted its report to Delhi Government recently, did not suggest odd-even formula for managing air pollution in the city (Vishnoi, 2015). Instead, IIT Kanpur report provides for gradual shift towards cleaner electric and hybrid technology –at least 2% of city's two wheelers, 10% of three wheelers and 2% of four wheelers (Vishnoi, 2015). While the government is focusing on exhaust emissions, not much action is in sight to reduce non-exhaust emissions such as brake wear, road wear, tire wear and road dust (Dev, 2015) whereas 'Source Apportionment Study of PM 2.5 and PM 10' conducted by IIT Kanpur has indicated top contributors for PM 10 as road dust (56%), concrete batching (10%), industrial point sources (10%) and vehicles (9%) while top four contributors for PM 2.5 are road dust (38%), vehicles (20%), domestic fuel burning (12%) and industrial point sources (11%) (Vishnoi, 2015).

### **Strategic Options**

Controlling and managing emissions from vehicles can be most effective and viable long-term strategy if it is integrated with curbing other sources of air pollution in the city such as road dust, concrete batching, domestic fuel burning and industrial point sources. Controlling emissions from vehicles can be accomplished by educating and sensitizing citizens on need for voluntarily controlling emissions, introducing/changing rules and regulations as required, enforcement of all the regulatory norms in true spirit without any laxity, and vigilantism by the non-governmental organizations, communities and people at large. Managing emissions is very much possible by leveraging technology to improvise automobile engines that meet highest standards in emissions, explore possibility of developing automobiles that can run on cleaner fuel, and develop smarter and efficient transportation systems.

Educating and sensitizing citizens is the most challenging but highly rewarding intervention. Already, environmental science has been introduced in schools. It is imperative that the subject is used appropriately to inculcate right mind-set at young age so that they turn gatekeepers at home in case they spot any violations of vehicular emission norms by their parents or any other elderly person of the family. In case the young people start taking a position on not allowing their parents to drive a car or a bike which is releasing too much smoky air (because the engine has not been tuned or the vehicle is not maintained properly or it is too old), the worsening scenario can be arrested in a big way without use of coercion or force of law-enforcement agencies. Right educational intervention will help create an environment-warrior in each home. This is possible only when the faculty members at school level take up leadership roles and ensure that the message has been internalized by their students in a manner which can result in desirable behaviour at home, in the community and world of work.

At the same time, the state should work towards fine-tuning the laws, rules and regulations to ensure strictest and consistent adherence to norms relating to vehicular emissions. Further, the government must also reduce corrupt practices prevalent among staffers of enforcement agencies. There is a widespread perception that one can manage to violate norms and skip the punitive action by simply paying small bribe of a hundred rupees or so. Hence there is no fear of law or law-enforcement agencies. The monetary cost of violating norms is miniscule and people are generally blind towards the long-term environmental cost of their erratic behaviour. Hence, adherence to norms should be ensured by the state by making appropriate changes in law and innovative enforcement procedures which are transparent, quick, consistent and without any loop holes. Penalty for violating norms should be such that work as deterrent.

Vigilantism of the community and citizens can also play a significant role in reducing vehicular emissions by raising moral pressure for compliant behaviour, reporting the violations without any fear and getting feedback on action taken by the enforcement agencies and sponsoring public interest litigation in case of failure state machinery in paying heed to the watchful community or citizens. Good news is that the government of Delhi has planned to invoke the good sense of the citizens in spotting polluting vehicles. Spotting visibly polluting vehicles to ensure emission compliance is a tried and tested strategy in many countries simply because it instils fear in those who have flouted pollution norms or have been driving without a valid 'pollution under control' certificate –such intervention has resulted in reduction of 50% of smoky vehicles in Hong Kong (The Times of India, 2015)

Leveraging technology to beat air pollution malady has been a common practice all over the world. For example, ACTA Global (Advanced Clean Air Technologies) has developed a new technologically advanced catalytic converter, which can drastically reduce emissions – with stringent testing parameters showing a 44 percent reduction in particulate matter being released into the atmosphere, nearly a 50% reduction in air pollution (Environmental Protection, 2013).

CristalACTiV Titanium Dioxide is another technological innovation which curbs the emission of pollutants during combustion. Pickett (2014) explains: 'In electrical power generation plants, selective catalytic reduction, utilising ultrafine titanium dioxide (TiO<sub>2</sub>) as a DeNO<sub>x</sub> catalyst, has been demonstrated to remove over 90 percent of the NO<sub>x</sub> generated by the combustion of coal, gas or other fossil fuels to produce electricity. TiO<sub>2</sub> acts as a catalyst to convert the harmful gases into harmless nitrogen and water vapour. This technology has been available for up to 30 years and has been demonstrated to be very effective. The technology is beginning to be used more widely to reduce the level of pollutants generated when producing electricity'

Pickett (2014) observes further: 'Systems are now available for use to reduce NO<sub>x</sub> and diesel particulate matter from tailpipe emissions. In these systems, we utilise the technology of ultrafine titanium dioxide in a similar fashion to the power plants, but engineer the materials to perform under the conditions found in vehicle emission systems. Ultrafine TiO<sub>2</sub> is an essential ingredient in many catalytic systems that allow emissions from diesel sources to meet increasingly strict environmental regulations, such as Euro IV, Euro V and Euro VI. These products are now widely used in the automotive industry. CristalACTiV Catalysts are found in many of the world's most recognizable brands of truck'.

A report of Association for Emissions Control by Catalyst (AECC) provides adequate fodder for optimism: 'Technologies exist for control of CO, HC, NO<sub>x</sub>, PM and PN, for stoichiometric and lean-burn gasoline engines and diesel engines. They are used and proven in many different applications. Continuous improvement in substrate and coating technologies, as part of an integrated system comprising electronic control and fuel quality, allows meeting more and more stringent combustion engines emissions legislations' (Favre et al. n. d.). However, fuel and lubricant quality must be in sync with the new technologies to optimise benefits (Favre et al. n. d.).

In an interview, Rajiv Bajaj, Managing Director, Bajaj Auto Limited, observed that emission norms in India are up to ten years behind those in developed countries while technology upgradation is the moral responsibility of auto manufacturers (The Economic Times, 2015). Automobile manufactures in India must wake up to the occasion and work towards accomplishing Euro VI norms instead of lobbying for relaxation by counting constraints. Cost of enjoying relaxed norms in India on the pretext of existing constraints will be much higher in terms of environmental degradation and human health.

### **Conclusion**

A closer look at various facets of the issue of worsening air quality in the city strengthens commonly held view that the Delhi Government has taken a hurried decision which may provide very short term gains without exploring long term strategic options. The government has also overlooked a number of scientific studies by IIT Delhi, IIT Kanpur, IIT Roorkee among others, which pointed out a number of sources of air pollution other than cars which play havoc with the health of people in the city. Hence odd-even formula appears as a misplaced solution

to a problem which we cannot ignore now. There is a risk of diverting the public attention from the root causes of poor air quality in Delhi by much hyped frivolous measure.

It is most appropriate time that the people of Delhi realize the bluff of the government and start pressurizing the state to explore long-term strategic options of controlling and managing air pollution. Unless we try to block the real and deadlier sources of air pollution, we cannot achieve any success in improving air quality in the city. Unfortunately, most of the lethal sources of air pollution such as trucks (even if plying through the city during nights), motorbikes, road dust, waste burning, concrete batching and industrial point sources will remain active. Besides there are a large number of rural traffic vehicles and non-CNG larger three wheelers which run on kerosene and thus contribute profusely toward deteriorating air quality. Many times, vehicles of municipal corporations are seen emitting excessive deadly smoke.

We need multiple interventions and strategies to ensure that people have clean air to breathe in the city. First of all, people need to be educated and sensitized about the whole issue. Currently people are getting aware of the matter thanks to media reports. Education and sensitization will ensure that they commit themselves to the cause of clean air by never violating any norms out of their own volition and without any fear of punitive action. Second, law enforcement should be made flawless –consistent, transparent and difficult to bypass. Third, we need to enhance vigilantism of the community and citizens in general so as to achieve total compliance. Fourth, we need to leverage technologies to beat the devil called air pollution. For this purpose, the government needs to adopt automobile emission norms at par with Euro VI norms. At the same time the government must also help reduce the constraints faced by automobile manufacturers so as to facilitate emission technology upgradation without much delay. So long as we are stuck in odd-even conundrum, we cannot have a long term view the issue of clean air will remain unresolved –much to the peril of unsuspecting citizens of Delhi.

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