

Fixing Delhi's Pollution: Status

	Key Data	Science	Economics	Technology	Policy
Biomass Burning	1. 14.4 mill ha. kharif rice. 2. 5.3 mill households in Delhi, Punjab, and Haryana use biomass/coal for cooking. 3. Similar levels of particulate matter released by burning fields and biomass stoves.	1. Paddy straw has high silica, is hard and difficult to process and is also bulky - high volume to weight ratio. 2. Biomass stoves create both indoor and outdoor pollution.	1. Collection and disposal of straw and stubble are expensive, and its price low because of few uses. 2. Difficult to supply LPG universally.	1. Mechanical harvesters spread straw on the field and leave more stubble than manual harvesting. 2. Zero-till seed drills are expensive and not yet popular among farmers. 2. LPG stoves create far less pollution and insignificant PM.	1. The government gives incentives for paddy and purchases a high share from north-west India, is harmful to due to overdrawing of underground water. 2. LPG use expanded after Ujwala Yojana but many households not yet covered.
Vehicular Pollution	1. 42.3 lakh 2&3 wheelers account for 56.3% of the PM due to vehicles. 2. 4.7 lakh diesel 4w vehicles account for 9.8%. 3. 11.4 lakh petrol 4w vehicles account for 9.5%. 4. 2.2 lakh commercial vehicles account for 24.2%.	1. High sulphur content fuels used in India pollute more. 2. Public transport such as metro, trains, and buses pollute less as they carry more people. 3. Pedestrians pollute least.	1. Profitable public sector oil companies invested in few clean technologies until recently. 2. Import or purchase of cleaner fuel not done. 3. Vehicle costs will rise with less polluting engines so manufacturers reluctant to better standards. 3. Public transport rarely operates efficiently in India.	1. India is dependent on low-quality coal and high sulphur fuels; investments required to substitute with better inputs and technologies. 2. Currently, two-wheelers pollute the most as they are largest in numbers, but BS6 compliant efficient 2w technology not well developed yet.	1. BS6 standards operable in 2020 will improve both fuels and vehicles, however, rapid growth will neutralize the benefits. 2. Govt. pushing electric vehicles, but this will take some years to fructify. 3. Policy focused most on private transport, less on public and none on pedestrians, this needs to be reversed.
Coal and Fly Ash	1. 80% of coal despatches in India go for coal power. 2. 27 coal power plants to the west and north-west of Delhi. 3. Most operated by central or state government-run entities. 4. Less than 6% of coal used is washed. 5. Of the 104 units in these 27 power plants, 46 units are 210MW or lower that are most polluting per unit energy.	1. Indian coal is low in sulphur so desulphurization not historically done; low calorific value requires more coal per MW produced. 2. Coal production releases ash, Nox and Sox compounds. 3. New technologies involve very large power plants that pollute less but much more than other sources.	1. Coal believed to be 'cheap' as (i) cost of pollution is not considered, (ii) lower emission equipment not used, and (iii) cheap high polluting inputs used till now. 2. Current pricing policies work against the operation of low polluting Natural Gas power plants. Other renewable substitutes can't be scaled currently.	1. Indian coal power plants among the least efficient and most polluting in the world. 2. Even globally, the latest coal power plants much less dirty but still highly polluting. 3. Coal plants can be converted to Natural Gas or biomass-powered; improved technologies can improve efficiency and emissions, but limited ongoing attempts.	1. Cash-strapped electricity boards, power, and coal govt. monopolies, little focus on environment till now. 2. No program yet for the improvement/closure of coal power plants. 3. Enforcement of emission regulations susceptible to corruption. 4. Information of pollution from each source point not captured or available publicly.
Soil and Road Dust	1. Delhi has 8,686 km of kucha roads. 2. Agriculture land to the west and north-west also contributes unknown amount. 3. Road construction and urban digging for pipes etc. contribute an additional significant amount.	1. Particles on the road that includes - dust, pollution, tire, bitumen, and exhaust are suspended due to the wind, and kinetic energy from vehicle movement. 2. Dug soil from public works and roads, from agriculture and also sands of Rajasthan further worsen the problem. 3. Delays and poor practices in public and road works.	1. Vacuuming or washing are expensive solutions to road dust. 2. Poor road maintenance. 3. Together, these create more road dust than well-maintained ones. 4. Delays in payment to contractors lead to dug soil remaining uncovered.	1. Little understanding of tyre or wheel design, road quality, speeds and how they interact under varying climatic conditions to produce SPM. 2. R&D on the effectiveness of possible solutions such as tire flaps, wheel covers, vacuuming, washing roads, etc. are rare. 3. Reduction in time taken to construct public works/roads needed.	1. Local govt. unable to monitor own staff or subcontractors. 2. RWAs and Non Profits are neither empowered nor made responsible or liable currently. 3. No liability on city managers for not carrying out functions. 4. Delays in payment to contractors combined with little answerability for delays for both contractors and city managers.
Solid Waste Burning	1. Delhi generates 12,000 tonnes of waste daily. 2. About 8,000 tonnes goes to overflowing landfills. 3. Waste to energy plants exist with capacity of more than 6000 tonnes but, cannot be used well as most garbage is not segregated. 4. Much of the garbage is either burnt to create space or rots in the open or is thrown into waterbodies.	If segregated, wet waste can be composted, dry waste such as glass can be recycled, or converted to energy like some plastics. If not segregated, composting, recycling, and waste to energy - all processes get adversely affected.	1. Segregation best if done in the household, costlier if done immediately after collection, and inefficient later. 2. Waste to energy and landfills require proper maintenance and outside monitoring of practices, emissions, and quick responsiveness. 3. Informal sector undertakes low-cost segregation but not feasible for items like cheap plastics etc.	1. Segregation, well-managed landfills, and waste to energy plants are well-known solutions but need subsidization. 2. Proper operating procedures and following best practices are critical and need organizational strengths. 3. Third party or community 24x7 monitoring, and rapid responsiveness has to be an integral component.	1. Municipal governments under-resourced and incapable, unable to meet the demands of a more service-oriented society. 2. The municipal commissioner is empowered but not liable for poor performance. 3. The political leadership is liable through elections but not empowered. 4. Communities and RWAs not empowered, liable or made responsible.
Others (industrial, construction, etc.)	1. Industrial units that use petroleum or coal-based energy or chemicals based processes form about 2/3rd of this component and also include Brick Kilns in and around the city-state. 2. Construction and stone cutting account for about a third. 3. Data on sales of coal suggests that the informal sector (presswalas, tandoor etc.) are a small contributor.	1. Particles are generated in stone cutting or mining and are also suspended in mixing of cement, sand, concrete etc. 2. Commercial generators, electricity transmission, etc. all naturally generate some emissions. 3. In all such cases, good practices and better technology can substantially reduce pollution.	1. Sources include those from organized, informal and illegal units. 2. Pollution reduction is costly corruption among government staff is common. 3. Greater stringency in law leads to greater corrupt behaviour, not reduced pollution. 4. Open community monitoring can address both pollution and corruption but has not been tried yet.	1. Pollution from construction and stone cutting can be reduced by (a) covering of the area/materials and (b) spraying water. 24x7 monitoring difficult for both government and managers of such units. 2. Industrial pollution can be reduced via emission reduction equipment and use of better inputs and technologies.	1. Corruption and limited abilities of local government staff prevent good implementation of stringent laws. 2. Need to incentivize the use of less polluting inputs and technologies by taxing more polluting ones. 3. The public sector to stop selling polluting fuels such as PET. 4. Incorporate community monitoring, municipal enforcement and liability for non-enforcement in emissions policy.