Ambient Air Pollution

Policy & Technology perspective

Umeandus Technologies India Private Limited

www.umeandus.in

info@umeandus.in

+91-95949 88046, +91-98994 89111

Air Pollution

Air pollution is a giant & silent killer. Breathing polluted air increases the risk of lung cancer, stroke, heart disease, chronic bronchitis etc. Air pollution is the world's fourth-leading fatal health risk, causing one in ten deaths in 2013.[1] About 87% of the world's population live in countries in which ambient pollution levels exceed air quality guidelines set by the World Health Organization. [1]

OECD Policy Highlights Report[2] calculates impact of outdoor air pollution on labor productivity, health expenditure and agricultural crop yields. The OECD Report projects global costs of pollution to increase from USD 3.2 Trillion in 2015 to USD 18-25 Trillion by 2060. **In India the** cost of air pollution is estimated to be Rs 3.39 lakh per second.[3]

Impact of Air Pollution	**India**	**Global**
Economic cost	$160Bn	$2.9Tn
(% of GDP)	5.4%	3.3%
Number of premature deaths	350,000	4,000,000
Reduction in crop yield	US$ 5Bn	US$ 20Bn
(% of yield)	36%	5-12%

Air pollution is a result of mobility and economic activities and development. PM pollution occurring naturally, like dust, is extremely difficult to control at source. For example, Gangetic belt in India and similar geographies across the globe face major challenge especially with hot and dry climate. In summary, major contribution to the Particulate matter pollution comes from distributed sources.

India with rapid economic growth will continue to face challenges from construction activities like electricity generation railways, highways, flyovers, metro, housing, factories, office complexes etc. which will compound with population and urban spread. Road widening, traffic growth and expansion of cities and towns will spread air pollution beyond current hotspots. In order to sustain economic growth of 7% -8% India needs to augment transportation and logistics infrastructure by 10 times to 20,000 billion Ton KM (BTKM) from current 2000 BTKM in next 20 years. This scale of construction and mobility will lead to major escalation in air pollution going forward. Not developing is not an answer since it will impact GDP growth.

On the other hand, increasing numbers & mobility of personal & commercial vehicles continue to add air pollution not only by tailpipe emission and tire dust will have compounded impact due to congestion. Congestion will increase not only in urban but also into hinterland. The EV will help tailpipe emission but increased electric power consumption will add air pollution at the point of electricity generation.

Rapid growth and distributed nature of air pollution caused by vehicles is one of the biggest challenges. India with its second largest road network and most dense road network in world faces a daunting task to control distributed generation of pollution. Road surface and tire wear and tear is expected to multiply in near future. Tire dust is expected to grow with bigger vehicles having wider tires. The impact in future is expected to be big as current four-wheeler ownership in India is below 15% and is expected to double by 2035.

Recently government announced plan to develop more than 20 new cities across states in India. While these developments are necessary, the air pollution challenge will continue to become severe and spread deeper into hinterland and smaller towns.

Technology Intervention

Tackling Particulate Matter (PM) pollution in the ambient requires technologies and solutions which are scalable, economically viable, and sustainable. Given the fact that generation is distributed therefore, the control mechanism should also be distributed. The technology and solutions must be capable of controlling pollution by capturing PM to reduce harmful exposure to the people in outdoor without the constraints of land and space with the ability to adapt according to seasonal variations between $PM_{2.5}$ & PM_{10} and long term sustained performance without frequent intervention. The system and technologies must be able to put captured PM for some meaningful purpose.

Technology and solution must also be capable to address ambient air pollution at the hotspots like industrial areas, busy road junctions, construction sites, railway stations, bus stations, airports, busy market place, hospital, schools, stadiums, airports, seaports etc.

Key intervention for the technology and solution

- Technology without dependency on Land Footprint
- Low or negligible electricity consumption
- Capability for large scale centralized or distributed deployment
- Centralized remote Operation, Management and Maintenance for efficient operations
- Capability to automatically adapt in accordance with variation in Ambient Pollution
- Long term sustained performance

Water spray and sprinklers are temporary solution as settled particulate matter become airborne again as soon as water dries up. Spraying water and artificial rain give temporary relief however, in medium and long term the method is more harmful as settled particulate matter which will have heavy metals like Arsenic, Lead, Mercury, Cadmium etc. will seep and mix with ground water. As water dries up on surface the concentration increases near surface due to mobility.

Filters based solution are not helpful in outdoor as they require frequent attention, replacement and the challenges of disposal. Most of the HEPA filters do have substances which are not bio degradable.

Electric Vehicle (EV) on the other hand is heavier compared to traditional Vehicles due to higher weight of batteries which results into very high wear and tear of tires and brakes. EV also suffers from the fact that vehicle occupancy at the charging station is much higher which will necessitate large ground space to be converted to charging spaces.

Attention must be paid to the disposal of collected dust with mechanized sweeper in pollution hotspots due to the higher concentration of dangerous elements like Lead, Mercury, Arsenic etc. in air which if dumped openly in dump yards will have serious consequences to the nearby population as well as ground water.

Measurement and data sharing should be real time and technology intervention for predictive modelling and extrapolation should be encouraged for more wholistic view of air pollution. Satellite based measurements must be integrated for timely prediction of pollution movement and hotspots.

Policy Intervention

Government is doing commendable job to address the air pollution at source by revising stack emission norm, tail pipes emission with cleaner and blended fuel. In our view these efforts are good and must continue. However, growth in economy and vehicle is much more to offset gains.

A policy which recognizes, encourages and incentives work in the area of controlling ambient air pollution is a must to bring a long-term sustainable solution. A policy to enable tradability of "pmcredit" like "carbon-credit" is required to bring all stakeholders to contribute in addressing ambient air pollution. There are four elements of the framework policy.

1. **The Clean Air Factory – Ambient Air Cleaning (Supplier of "pmcredit")**

Under the policy efforts to reduce ambient air pollution will earn credits. For example, an effort to clean ambient air by cleaning it and releasing back into ambient will earn credit based on the volume and quantity of air cleaned. It will mean for example, if a factory is set up with a certified quality and quantity of ambient air cleaning will earn credits based on production of clean air. The definition and quantity of "pmcredit" can be defined based on requirement of a location and severity of the problem.

2. **Air Polluters – Designated Air Polluters (Demand of "pmcredit")**

The "pmcredit" earned by ambient air cleaning factory can be traded by designated air polluters. Air polluters can be defined and quantified based on location and severity of the problem by the government and regulatory authorities. Designated air polluters will have to either reduce air pollution to zero or buy credit to achieve "pmneutrality" like "net-zero" in case of carbon footprint. Cost of achieving "pmneutrality" will be lower compared to not achieving it.

3. **The Trading Platform – Administrator ("pmneutrality")**

The trade of "pmcredit" will happen thru a platform owned and operated by a neutral third party like a public sector company. The trade on the platform will happen between supply (ambient air cleaner) and demand (designated air polluter). The supply of "pmcredit" by suppliers (ambient air cleaners) will be listed for air polluter (demand) to buy online. The value of "pmcredit" would vary depending on the gap between demand and supply. The policy envisages that the platform will be operated like an exchange, hence cleaned air "pmcredit" can be traded like a commodity. The supply to the platform is verified with real time visibility of the factory and its production by regulation and technology.

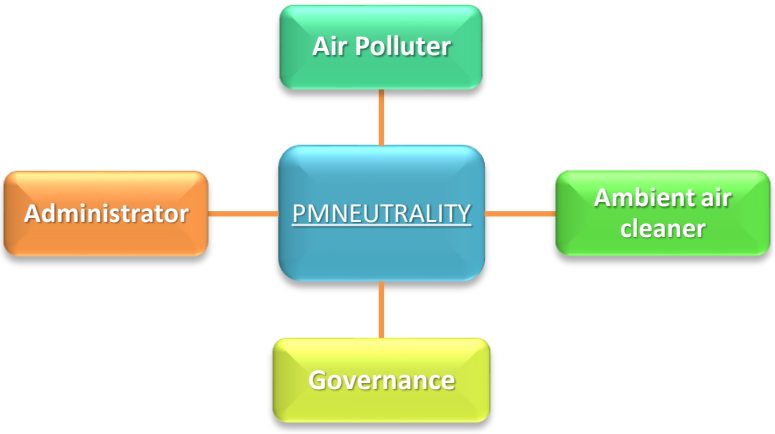
4. **The Government – Governance**

The government will be responsible to decide on the polluters and their footprint with benchmark. The policy expects to define top 20 polluters with definition and quantum and timelines to achieve "pmneutrality" initially and the list can be expanded in future.

In our views addressing air pollution needs collective efforts by every stake holder and it cannot be solved by government and compliance alone. It requires active participation from stakeholders with incentivization. The policy must envisage a "pmneutrality" like "Carbon-neutrality" or "NetZero." Policy intervention is required to make PM Pollution tradable like "Carbon Credit."

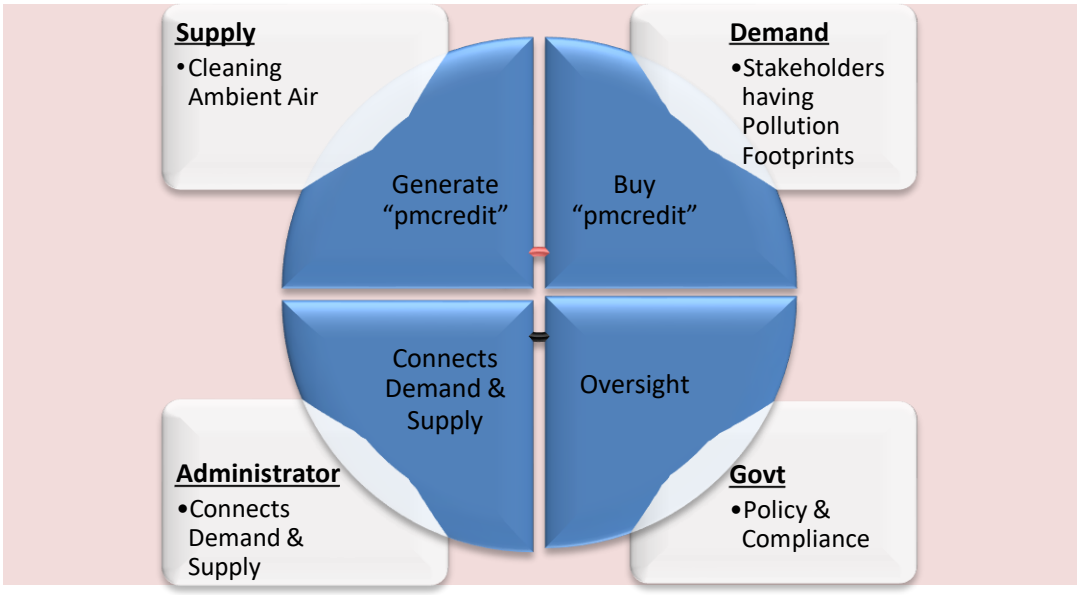
The policy required to make "pmcredit" tradable with the objective to achieve "pmneutrality" by each and every major stakeholder on their own. The Government can focus on Policy and Compliance with rest of the efforts become responsibility of every stakeholder. The government can incentivize to accelerate achieving "pmneutrality" timelines for a region or a segment.

Policy should mandate any development going forward must have “pmneutrality” plan integrated to get approvals from relevant authorities.



Framework is to bring all stakeholder together for Ambient Air Pollution Control.

In summary the credit scheme will require policy enablement, compliance to achieve “pmneutrality”, incentivize participation and increased cost of non-compliance to “pmneutrality”.



Sustainable Approach for “Net-Zero PM-Pollution”

Policy intervention to achieve “pmneutrality”

- Policy to allow trading of pollution credit.
- Ambient Air cleaning process should be eligible for “pmcredit”
- Government to designate and quantify polluters depending on the geography and severity of the challenge
- Online trading of “pmcredit” thru a third-party neutral administrator.
- Ambient Air Cleaning factory definition, quality, and quantum to be approved by government
- Monitoring of the production of the air cleaning to be done by administrators to award “pmcredit”
- The Objective of the policy is to achieve “pmneutrality” by the designated air polluter.
- Non-compliance to “pmneutrality” to cost higher for the designated polluter compared to compliance.
- Development in future must have “pmneutrality” plan integrated for approvals from environment point of view.

- ✓ Connect Demand & Supply to achieve “PMNEUTRALITY.”
- ✓ Policy intervention to monetize “ambient air purification.”
- ✓ Independent body to quantify Pollution footprint and ambient air cleaning by the suppliers.
- ✓ Polluters with have multiple choices of either shutting down, to install air purification system or buy credits thru platform.

Some Examples

An industrial area whose pollution footprint can be quantified based on various parameters like area and type of factories. The task of achieving “pmneutrality” can assigned to all stakeholders of the industrial area itself. Every stakeholder can take necessary steps individually or collectively. This will be involving compliance with the emission norms which are already in place but also on the ambient norms. e.

Supply chain today is moving to decarbonize at every stage given the global thrust, similarly, policy of “pmneutrality” will increase widespread implementation of the measures to control particulate matter and pollution at every step of the supply chain. In this example also “pmneutrality” will the goal to achieve.

A parking lot for a market, business or mall can be quantified for its pollution footprint and they can be mandated to achieve “neutrality”.

In order of achieve “pmneutrality” stakeholders can take their own measures or buy “pmcredit” from the factory which is cleaning ambient air.

About Us

Umeandus™ Technologies India Private Limited (UTIPL) is engaged in designing & developing innovative technologies focused on creating sustainable infrastructure for transportation, logistics and environment improvement to combat challenging problems. Given the global urgency to accelerate environment protection, halt climate change and enhance sustainability, UTIPL objective is to design innovative solutions having commercial, economic, and environmental viability.

UTIPL works with **ABCDE Centre of Excellence at SASTRA deemed University**, Thanjavur, Tamil Nadu, **IIT Guwahati, IIT Delhi, DRIIV** (An initiative of Principal Scientific Advisor, GOI) and **many others.**

Vision for clean, green & sustainable world.

REFERENCES

1: World Bank and Institute for Health Metrics and Evaluation (IHME) University of Washington, Seattle 2013: The Cost of Air Pollution Strengthening the Economic Case for Action
2: OECD Policy Highlights Report: The Economic consequences of Outdoor Air Pollution, June 2016
3: Greenpeace Southeast Asia and Centre for Research on Energy and Clean Air (CREA)