

- 1) Ambient Air Pollution: Context, Impact, Cause and effect, Projects that has explored the subject
- 2) Indoor Air Quality: Context, Impact, Cause and effect, Projects that has explored the subject
- 3) Solutions & Mitigation Strategies

Context: Global **Pollution Burden**

After quite some time, World Bank's webinar (aired live January 11th) on "Fixing Pollution : A winning formula for Health and Wealth" drives up the issue of pollution on global agenda of Enterprises and Governments. This is worth sharing with the audience.

The report came out on Oct 2017 and has been heralded as a work that - **tells you about the current state of the world** in context of pollution. The report brings out the key things:

1. Data – Pollution kills and the death rate for non-communicable diseases is way higher than anything that kills humans on earth. Pollution affects GDP / human productivity and for those who don't mind humans dying – the impact on GDP could enable action!
2. Is pollution is on agenda of Government and Enterprises at this point of time ? **No it is not.** However, now is the tipping point for pollution this work must be shared, read, digested, actionized by all to beat pollution.
3. Climate action is much hyped – what we need to understand is that sources of air pollution and GHG are same and carbon is intrinsically linked to pollution. We need to look at mitigation projects from co-benefits perspective.
4. What you don't measure you cannot manage – the report recommends setting up monitoring networks which will enable action.
5. Good news to all this is that we can beat pollution and its good for health and wealth of humans. We have the knowhow and the technology to tackle this problem.
6. CSR – There is scope to focus on pollution – as of now CSR funds for pollution is miniscule – we must know that a polluted world is not socially equitable. None of the CSR funds in the world are working on beating pollution – this needs to change.

"Pollution caused 9 million premature deaths in 2015 — 15 times more than wars or other violence. Air pollution alone cost the global economy \$5.7 trillion in 2016, according to a study by the Lancet Commission on Pollution and Health. We discussed these findings at a special event today on Fixing Pollution. The good news is countries can do something about this problem, and they can do it while also boosting economic growth. Mexico dramatically improved air quality between 1989 and 2012 while the country's GDP nearly doubled. The World Bank Group invested \$4 billion to fight pollution in 2016, and we will do more. The Lancet commission's findings will help us focus our efforts where we can have the most impact. Read More : <https://lnkd.in/ff4kHBi>

Pollution Burden India:

[https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196\(18\)30261-4.pdf](https://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196(18)30261-4.pdf) – From the report

The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: the Global Burden of Disease Study 2017

Interpretation of the Study : India has disproportionately high mortality and disease burden due to air pollution. This burden is generally highest in the low SDI states of north India. Reducing the substantial avoidable deaths and disease burden from this major environmental risk is dependent on

rapid deployment of effective multisectoral policies throughout India that are commensurate with the magnitude of air pollution in each state. 1 in every 8 deaths in India is attributed to air pollution.

This study was conducted in 31 locations across the country and funded by Bill and Melinda Gates foundation along with the Indian Council of Medical Research. Air Pollution accounts for 12.5 % of deaths in the country. Vulnerability to air pollution is accentuated by lung diseases, cardiovascular issues and diabetes which can lead to stroke, chronic obstructive pulmonary diseases, lung cancer and ischaemic heart.

Sources of pollution Outdoor and Indoor:

In India, the major sources of ambient particulate matter pollution are coal burning for thermal power production, industry emissions, construction activity and brick kilns, transport vehicles, road dust, residential and commercial biomass burning, waste burning, agricultural stubble burning, and diesel generators.

Household air pollution is caused mainly by the residential burning of solid fuels for cooking and to some extent heating, the major types of which are wood, dung, agricultural residues, coal, and charcoal.^{12–14} Ground level ambient ozone is produced when nitrogen oxides and volatile organic compounds emitted from transport vehicles, power plants, factories, and other sources react in the presence of sunlight.¹⁵ Rapidly developing countries such as India face the dual challenge of exposures from both ambient and household air pollution.

Commercial Space : Indoor Air Quality and Productivity

We breathe 15,000L of air per day, i.e, we consume 5,000 times more air than water in terms of volume. It comes as no surprise that minor variations in air quality dramatically impacts health and productivity.



**21% decrease
in productivity***

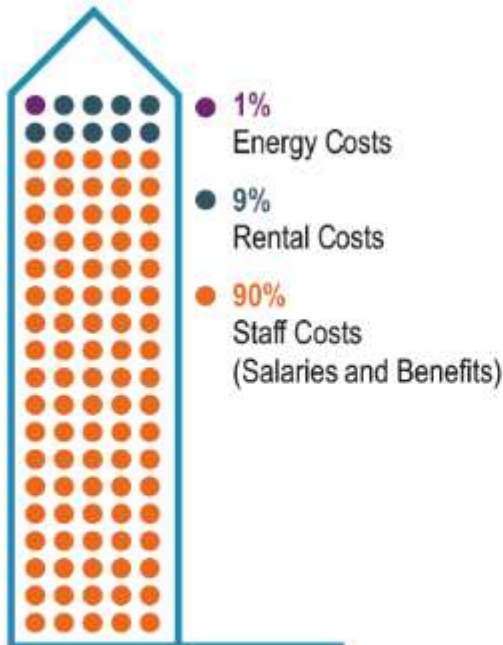
For every 400ppm increase in CO₂



**13% decrease
in productivity***

For every 500µg/m³ increase in VOC

* For tasks that require a high degree of focus and analysis.
Harvard School of Public Health; *Associations of Cognitive Function Scores
with CO₂, Ventilation, and VOC Exposures in Office Workers*; J.G.Allen,
P.MacNaughton, U.Satish, S.Santanam, J.Vallarino, J.D.Spengler



10% Variation
A 10% variation applied
equally to each cost has a
far from equal impact

+/- 0.1%

Energy Costs

+/- 0.9%

Rental Costs

+/- 9.0%

Staff Costs

Source: World Green Building Council's Health, Wellbeing & Productivity in
Offices Report. 2014.

Primarily for commercial buildings the sources of air pollutants are:

Indoor air is typically 10 to 100 times more polluted than outdoors.

- Virtually all homes are negatively pressurized, pulling ~75% of outdoor pollutants in.
- Outdoor pollutants such as Particulate Matter (PM_{2.5}, PM₁₀), sulphur dioxide, ozone and nitrogen dioxide are mixed with indoor pollutants such as formaldehyde and benzene, emanating from building materials and furniture.
- Other indoor pollutants include toxic flame retardants, harmful plastic and heavy metal particulates from building materials and furniture.

In rural areas:

Government initiatives to reduce solid fuel use for tackling household air pollution include a major scheme initiated by the Prime Minister of India in May, 2016—the Pradhan Mantri Ujjwala Yojana.²¹ This scheme had planned to provide clean and safe cooking fuel (liquefied petroleum gas) to 50 million low-income households by March, 2019, by adding 10 000 more distributors, increasing access, and covering nearly all the upfront costs of switching for low-income households. Encouragingly, the original target of 50 million households was met in August, 2018, and the government has now increased the target to reach 80 million households through this scheme with a total budget of US\$1.8 billion.

Sustained use of cleaner fuels and a wider community adoption across the country will drastically improve health of communities.

Strategies for Pollution Control:

1. Identification of sources
2. Correlating weather conditions – understanding the air basin
3. Monitoring and modelling
4. Reducing emissions from transport
5. Reducing emissions from commercial and industrial sources
6. Reducing emissions from agricultural sources
7. Reducing emission from construction activities
8. Reducing emission from garbage burning
9. Rewarding good behaviour
10. Citizen connect and awareness
11. Behavioural change
12. Political will and influence
13. Role of citizen, government and corporates