

Air Pollution in India

Impact, policy analysis and remedial measures by governments

Today, air pollution has emerged as a **global public health problem** and is identified as a major environmental health hazard by agencies such as the World Health Organization (WHO) and governments around the world. An increase in concentration of pollutants - both gaseous and solid - is among the largest health risk in the world and according to the latest data released by WHO, indoor and outdoor air pollution were responsible for *3.7 million deaths of people aged under 60* in 2012.

In recent years, air pollution has acquired critical dimensions and the air quality in most Indian cities that monitor outdoor air pollution *fail to meet WHO guidelines for safe levels*. The levels of **PM2.5** and **PM10** (Air-borne particles smaller than 2.5 micrometers in diameter and 10 micrometers in diameter) as well as concentration of dangerous carcinogenic substances such as Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) have reached alarming proportions in most Indian cities, putting people at additional risk of respiratory diseases and other health problems. Furthermore, the issue of indoor air pollution has put women and children at high risk.



A recent study by Yale and Columbia University ranked India 126th out of 132 countries surveyed on environmental performance and **worst for air pollution**; far below all BRICS nations i.e. Brazil, Russia, China and South Africa.



According to a WHO report from 2014, Delhi had the dirtiest atmosphere of 1,600 cities around the world. **13 Indian cities** feature in the 20 cities with the highest level of PM 2.5; Delhi having a *PM2.5 level of 153*, six times higher than the WHO safe limit of 25.

Major Causes of Air Pollution in India



As of Jan 2015, **coal-powered** thermal power plants account for **60.72%** of India's total power generation, according to data available from Central Electricity Authority (CEA). Coal plants happen to be one of the *leading sources of SO₂ and NO₂*.



As per Census 2011, **87%** of rural households and 26% of urban households depend on **biomass for cooking**. Burning of biomass is a *leading cause of indoor air pollution* and is responsible for respiratory and pulmonary health issues in approximately 400 million Indians.



Growing number of cars in Indian cities - Private & commercial vehicles account for **66.28%** of the total consumption of diesel*. Low standards for vehicle emissions & fuel have resulted in increased levels of Nitrogen Oxides & Sulphur.



The proportion of rural households using kerosene as a primary source of energy for lighting is **almost 30%**. Kerosene lanterns used in rural areas are a *primary source of emission of black carbon soot* and cause significant health impact, particularly in the case of women and children.

*Source: Petroleum Planning and Analysis Cell, Petroleum Ministry

It is in this context that this brief analyzes the impact of air pollution on India and the initiatives and policy measures undertaken by the government, such as adopting automobile fuel emission standards and launching the Air Quality Index in order to reduce air pollution as well as enhancing public awareness on this issue of great public importance.

Impact of Air Pollution in India

Air pollution, both indoor (household) and outdoor, has had a significant impact on the health of citizens as well as the economy. The adverse effects of air pollution are not just restricted to the urban areas but also impact rural areas, where a majority of the population relies on kerosene and burning of biomass for lighting and cooking purposes respectively.

Air pollution is among the leading causes of death in India

The Global Burden of Disease Report has ranked outdoor air pollution as the fifth leading cause of death in India and indoor air pollution as the third leading cause. Outdoor air pollution was responsible for 6,20,000 deaths in 2010, increasing six-fold from 1,00,000 deaths in 2000. Moreover, a research study by researchers at the University of Chicago, Harvard and Yale estimated that high Particulate Matter (PM) concentration is responsible for reducing the **life expectancy by 3.2 years for 660 million Indians** living in urban conglomerates.

Negative impact on agricultural productivity

A recent research study “*Recent climate and air pollution impacts on Indian agriculture*” by scientists at the University of California, San Diego suggests the adverse impact of air pollution caused by Short-Lived Climate Pollutants (SLCPs) on agricultural productivity. They observed that the yield of wheat in 2010 has reduced by **almost 36%** and that of rice by **20%** when compared to figures from 1980, negating for climate change. SLCPs such as ozone and black carbon are released into the atmosphere by motor vehicle exhausts and rural cook stoves respectively. These SLCPs remain in the atmosphere for short periods.

Cost of Air pollution amounts to 3% of the GDP

A World Bank report titled ‘Diagnostic Assessment of Select Environmental Challenges in India’ highlighted that the annual cost of air pollution, specifically pollution from particulate matter (burning of fossil fuels) amounts to 3% of the GDP of the country; outdoor air pollution accounting for 1.7% and indoor air pollution for 1.3%. The report also observed that a 30% reduction in particulate emissions by 2030 would **save India \$105 billion in health-related costs**; a 10% reduction would save \$24 billion.

In light of the adverse impacts, coupled with the fact that the concentration of particulate matter in 180 Indian cities is almost six times higher than the standards set by the WHO, the issue of quality of air has become a major concern for the government of India.

Summary of key Government Initiatives & Policy Measures to tackle the issue

Amid growing concerns pertaining to rising air pollution, government of India has taken various initiatives as well as introduced policies to address the issue. In order to prevent and control air pollution, the Parliament of India enacted the **Air (Prevention and Control of Pollution) Act, 1981** on 29th March 1981, which came into force on the 15th May of the same year. The Central Pollution Control Board (CPCB), a statutory organization under the Ministry of Environment & Forests (MoEF) has been entrusted with the responsibility of *ensuring ambient air quality* and has been conferred and assigned the power and functions to achieve the stipulated objective. Thereby, the CPCB in association with various State Pollution Control Boards (SPCBs) **monitors the ambient air quality according to the National Ambient Air Quality Standards (NAAQS) with the help of 580 manual stations established in 244 cities, towns and industrial areas.**

Moreover, **a total of 42 questions on air pollution, its impact and efforts to check emissions and air pollution have been raised in the last 3 sessions of Parliament (24 in Lok Sabha & 18 in Rajya Sabha)**, which suggests increasing concern among Members of Parliament on the said issue. This section covers the significant government initiatives and policy measures over the past few years that are aimed at curbing both indoor and outdoor air pollution.

I) Steps to curb vehicular emission

With the increase in number of vehicles on Indian roads, air pollution resulting from vehicular emissions has become the main source of air pollution in the urban centres of the country. Moreover, in FY 2014, the share of diesel cars in overall car sales was 53%. According to a report released by the International Council on Clean Transportation, diesel vehicles are responsible for 56% of all PM emissions and 70% of all Nitrogen Oxides (NOx) emissions from on-road vehicles in India. Moreover, the content of sulphur in fuel makes it dirtier and lowers the efficiency of catalytic convertors, which control emissions in automobiles. Therefore, several steps have been taken to mitigate the issue of vehicular emissions.

Adopting emission norms and fuel regulation standards

Since the year 2000, India started adopting European emission and fuel regulations for all categories of vehicles. Under this plan, the **Bharat Stage II** emission standards were introduced initially in the four metro cities to manage the amount of air pollutants released by the internal combustion engine equipments by using **cleaner fuel with low sulphur content** and improved combustion engines. Accordingly, oil marketing companies were required to supply BS compliant fuel and auto manufacturers had to upgrade engines in a phased manner. Later on, the Bharat Stage fuel norms were applied to the rest of the country; **as of 26th November 2011, BS – IV norms** are applicable in 34 cities whereas BS –III norms are applicable in the rest of the country. However, India has been following European norms with a time lag of five years and it is infact a decade behind developing countries such as Turkey and Brazil in introducing cleaner-burning fuel. The *Saumitra Chaudhari Committee*, formed to look into automobile fuel emission standards, has recommended that the government introduce the Bharat Stage – V norms across the country by 2020.

Promotion of cleaner technologies and alternate sources of energy to run vehicles



National Mission for Electricity Mobility (NMEM) is aimed at enhancing penetration of efficient and environmentally friendly hybrid and electric vehicles; GoI earmarked 1,000 crores for the Plan in 2015 with an eye to decrease CO2 emissions by 1.2-1.5% in 2020.



Promotion of the cultivation, production and use of biofuels to substitute petrol and diesel in automobiles. Indicative target of 20% blending of bio-fuels such as bio-diesel and bio-ethanol by 2017 is proposed; *Ethanol run bus launched in Nagpur under 'Green Bus' Project.*

National Urban Transport Policy: *Encouraging greater use of public transport in urban areas*

Most Indian cities are increasingly relying on motorized personal transport; in cities like Pune & Ahmedabad, motorized personal transport (in the form of cars and two-wheelers) accounts for a 48% and 44% share in the modes of transport used, respectively. With this in mind, the **National Urban Transport Policy** launched in 2006 by the Ministry of Urban Development (MoUD) and reviewed in 2014 seeks to *prioritize the use of public transport running on cleaner fuel and technology and develop a people-centric sustainable multi-modal urban transport network*, taking into consideration the unique characteristics and specific situations prevalent in cities. Therefore, various cities have either adopted or are in the process of developing public transport systems such as Mass Rapid Transit Systems (MRTS), Light Rail Transit System (LRTS) & Bus Rapid Transit Systems (BRTS); currently 14 MRTS, 8 BRTS are operational in India.

II) Reducing the dependence on biomass burning in rural households

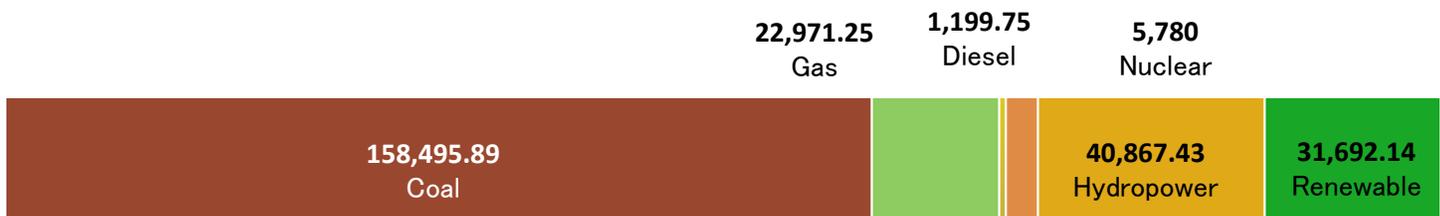
Biomass – fuel wood, agricultural residue and animal waste – is among the most prevalent sources of energy in India, with almost 87% of rural households and 26% of urban households dependent on biomass for cooking. These fuels are burned in outdated cook stoves as a result of which they emit harmful pollutants, contributing to indoor air pollution in rural areas. The Government of India has focused on the importance of clean and efficient cook stoves in order to reduce emissions as well as the health hazards associated with inhalation of these emissions.

National Biomass Cookstoves Programme: *improved cookstoves to reduce indoor air pollution*

The National Biomass Cookstoves Programme (NBCP) was launched by the Ministry of New and Renewable Energy to promote the use of improved cookstoves, which would result in reduced emissions and offer cleaner cooking energy solutions. As part of this programme, the government undertook wide consultations with NGOs, entrepreneurs and industries in the country with the objective of identifying ways and means for the **development and deployment of improved biomass cook stoves** across a large number of community undertakings and individual households.

Based on further discussions and deliberations, the government initiated the *National Biomass Cookstove Initiative* to design, develop an efficient and cost-effective device and assess the status of improved chulhas. Under this initiative, pilot scale demonstrative projects were undertaken to test for the efficiency of community-size cook stoves in Mid-day meal schemes in government schools in states of AP, Chhattisgarh, UP, Maharashtra, MP and Haryana and individual biomass cook stoves in J&K, Bihar, Karnataka, UP and Jharkhand. The results of the projects indicated substantial reduction in emissions and fuel consumption. Accordingly, the **Unnat Chulha Abhiyan** has been launched to expand the deployment of the improved cook-stoves across the country. **Rs.131 crores** have been allocated for promotion of improved cookstoves and solar cookers in the Union Budget 2015-16.

III) Renewable Energy – the new area of focus to reduce dependency on coal



Total Installed Capacity: 261,006.46 MW

Source: CEA Executive Summary Feb - 2015

India is extremely rich in renewable energy (RE) sources, such as wind, solar and small hydro, however, green energy accounts for only **12.14%** of India's total installed power capacity. According to the India Renewable Energy Status Report 2014, the total renewable energy potential from various sources in India is 2,49,188 Mw which implies that only 12.71% of the potential has been achieved. Moreover, wind energy constitutes almost *65% of the total renewable energy* generated in the country. It is imperative that the country alters its existing energy mix and reduce its reliance on coal and shift to greener modes of energy. **The Electricity Act, 2003** proposed mandatory Renewable Purchase Specifications (RPS) for all states in order to increase the uptake of electricity from renewable energy sources. 26 State Electricity Regulatory Commission (SERC) specified the mandatory purchase obligation for purchase of fixed percentage of energy generated from RE sources.

It is in line with this idea that the government has set an ambitious target to achieve **175,000 MW of green energy by 2022** including one lakh MW of solar power, 60,000 MW of wind energy, 10,000 MW of biomass and 5000 MW of small hydro projects. Accordingly, several incentives and policy initiatives at the Central and State levels have been put in place both for grid connected and off-grid renewable energy

Solar Power: *to become a crucial component of India's power portfolio*

The **Jawaharlal Nehru National Solar Mission (JNNSM)**, part of the missions launched as part of the National Action Plan on Climate Change seeks to tap the immense potential of solar power as a future energy source in the country. As part of the mission, it is envisaged that the installed capacity of solar power – both solar thermal and solar photovoltaic - should be ramped up to 20 GW by 2022 in three phases; in order to achieve the same, an enabling policy framework for manufacturing solar components and setting up power plants should be created. Furthermore, off-grid applications are to be promoted and steps taken to bring tariff to grid parity level. This mission has been largely successful and the current

government has revised the target to 100 GW by 2022. Currently, the second phase of the Solar Mission is underway and the **total installed capacity of solar power stands at 3,382.78 MW** (as on 28.02.2015).

Role of states in promoting renewable energy

States are expected to play a pivotal role in promotion of RE by establishing a policy and regulatory framework that incentivizes generation and purchase of RE. Certain states have taken the lead in attracting sizeable investments in the RE space by unveiling policies providing tax exemptions such as reduced VAT on RE components, adopting preferential tariffs for purchase of power from RE sources and initiatives for production of RE that connects to the grid as well as off-grid applications. Moreover, most of the progress in the RE space has been state-driven till date with states like Gujarat, Tamil Nadu, Rajasthan and Madhya Pradesh focusing extensively on diversifying their energy mix; *almost 38% of TN's total installed power capacity comes from RE.*

The success of initiatives such as **Gandhinagar Solar Photovoltaic Rooftop Programme** - *to establish and generate Solar Power by setting up grid interactive rooftop Solar Photovoltaic systems in Gandhinagar in order to make it a solar city* – have encouraged other states and cities to encourage public participation in generation and utilization of green energy sources.

Move from carbon subsidization to carbon taxation

Cess on coal has been doubled to Rs. 200 per tonne from Rs. 100 per tonne, which will boost renewable energy financing. India is among the few countries in the world to have introduced such a tax. The cess is collected as National Clean Energy Fund and is disbursed for renewable energy-based initiatives and power projects.

IV) National 'Air Quality Index' to enable common man to understand Air Quality

Announced in October 2014 by the Ministry of Environment, Forests and Climate Change, the National Air Quality Index (AQI) is a measurement index consisting of 8 parameters, which would disseminate information in a **simple and effective manner to the common man** as characterized by its slogan "**One Color, One Number and One Description**". This data would be available for 10 cities in the first phase after the launch and would be disseminated in a real-time manner to enhance public awareness. Under the AQI scheme, the levels of the 8 pollutants are categorized as Good, Satisfactory, Moderately Polluted, Poor, Very Poor and Severe based on the ambient concentration, conformity to National Ambient Air Quality Standards and likely health impact. It is planned that this air quality index would be extended to 20 state capitals and 46 million plus cities over the next couple of years. *This was launched by the Prime Minister on the 6th April, 2015.*

Conclusion

Air Pollution is a complicated issue and negatively impacts the health of citizens as well as the economy of the country. Both indoor and outdoor air pollution have emerged as one of the leading causes of deaths in India and while recent reports highlight the worsening outdoor air pollution in urban centres, indoor air pollution due to biomass burning and inefficient 'chulhas' is also an area of concern. The Government of India and the state governments have recognized the adverse effect of air pollution and there is increased seriousness about addressing the air quality issue among all the stakeholders.

Furthermore, recent efforts such as the launch of National Air Quality Index point to the need for enhancing public awareness on the quality of air they are breathing. A shift towards renewable energy is part of the plan to reduce dependency on fossil fuels as well as provide clean energy to households, which are currently using kerosene for lighting purposes. It is important that a comprehensive, integrated and long-term plan of action, involving coordination between different ministries and departments, is drawn to address the issue, reduce air pollution and ensure that citizens breathe clean air.