

NATIONAL CONFERENCE ON AIR POLLUTION

# HealthyAir

*Collaborating efforts to mitigate pollution  
in the Indo-Gangetic Plain*

Tuesday, 31 October 2017 | Hotel Maurya, Patna

## BACKGROUND NOTE

An initiative supported by  
SHAKTI SUSTAINABLE ENERGY FOUNDATION



**SHAKTI**  
SUSTAINABLE ENERGY  
FOUNDATION



## About CEED

Centre for Environment and Energy Development (CEED), an environment and energy expert group involved in creating sustainable solution to maintain a healthy, rich and diverse environment. CEED primarily works towards clean energy, clean air, clean water and zero waste solutions by creating an enabling environment and policy framework to scale up investments in low carbon development, climate mitigation and adaptation. CEED engages with the government, industries, leaders, think-tanks, stakeholders and public to create environmentally responsible and socially-just solutions.

# Conference Brief

In the year 2016, World Health Organisation (WHO) released a report stating that **92% of the global population lives with bad air quality, and around 3 million deaths annually can be linked to exposure to outdoor air pollution.** These two facts clearly suggest that air pollution is one of the major public health disasters, globally. The same WHO report also confirms that 11 out of 20 most polluted cities in the world are Indian cities and most of them are in the Indo-Gangetic plain. Some of the most polluted cities in the Gangetic basin are Kanpur, Lucknow, Firozabad, Allahabad, Varanasi, Patna, Muzaffarpur and a few towns in Jharkhand. While the pollution levels are not restricted to urban areas only, the rapid increase in pollution levels in these cities can be attributed to rising anthropogenic sources, and is strongly related to unplanned and ill-managed urbanization. Most of the cities are facing severe bad air quality issues, which can be corroborated from the fact that has been an evident rise in non-communicable diseases, notably cardiovascular diseases, stroke, chronic obstructive pulmonary diseases and lung cancer in these cities.

“Exposed to severe levels of air pollution:  
along 12,500 sq. km Gangetic river basin  
35,000,000 people / 29 cities / 48 towns”

Particulate matter like PM2.5 and PM10 are main causes of the worsening air quality of our cities. Particulate matter smaller than 10  $\mu\text{m}$  (PM10) enters our respiratory tract; but fine particulate matter smaller than 2.5  $\mu\text{m}$  (PM2.5) reach alveoli. Therefore, PM2.5 is considered to be the most harmful by World Health Organization (WHO). **Monitoring air quality in India is a recent phenomenon, largely under the domain of the government, led by Central Pollution Control Board.** PM2.5 monitoring is limited only to a few cities and that too with only a few monitoring stations. Lack of data monitoring and its availability in public domain is currently the biggest challenge for any collaborative and time-bound action plan for air pollution in India. **The public debate around air pollution has taken a momentum in India in the last few years**, but remains centred around big cities like Delhi and around key religious festivals like Diwali, when fire-crackers (one of the major sources of air pollution) are burnt at large scale. Since the debate remains seasonal more often than not, it misses the real contour of air pollution impact; which is wide-spread geographically including smaller cities and villages as well; and are contributing sources that are chronic and long term. **Although in the Indo-Gangetic plain, meteorology and topography (loose alluvial soil in the Gangetic basin) are considered a major contributing factors, but sources such as inefficient and fossilised transport, solid fuel burning for cooking, waste burning, coal-fuelled power plants, and industrial activities cannot be taken lightly** in terms of their impact on deteriorating the air quality in most of these cities. CEED's assessment suggests that solid fuel burning for cooking and inefficient transport are biggest factors for worsening air quality in most of the cities in the Indo-Gangetic plain.

A recent order by the Honourable Supreme Court of India on Graded Response Action Plan for Delhi and Delhi's/ NCR's air quality has opened up possibilities of similar Clean Air Action Plan in the states of the Indo-Gangetic Plain since the cities of this region have similar or worse air quality than Delhi/NCR. However, **state-specific Clean Air Action Plan will not serve the purpose.**

**“Air pollution is transboundary; any corrective, short/long-term action plan has to be a collaborative effort among neighbouring states to avoid pilferage”**

Furthermore, for developing any framework for an action plan, emission inventory is required which needs to be prepared at the state level, but ought to be shared at regional levels for coordinated action. Therefore, to explore key aspects of air pollution in the Indo-Gangetic plain, Centre for Environment & Energy Development (CEED) is organising a National Clean Air Conference on **“Healthy Air: Collaborating efforts to mitigate pollution in Indo-Gangetic Plain”** in Patna between 10 am and 5 pm on 31<sup>st</sup> October, 2017. The conclave shall witness the inaugural keynote address by Honourable Deputy Chief Minister and Environment Minister of Bihar, Shri Sushil Kumar Modi and special keynote addresses by Honourable Environment Minister of Uttar Pradesh and Jharkhand. The Member Secretary of State Pollution Control Boards of UP, Bihar and Jharkhand shall also be present at the event; to explore possibilities of a regional collaboration on a clean air action plan, and to discuss the mitigation measures to reduce particulate emission in our cities.

**Through this conclave, we look forward to achieve the following objectives to ensure public momentum towards improving air quality of the region.**

- Identify key areas of engagement and action for regional collaboration between Pollution Control Boards and government agencies of Uttar Pradesh, Bihar and Jharkhand.
- Create regional cooperation and collaboration between different stakeholders including government and non-government organizations of all the three states to ensure smooth exchange of information and learnings.
- Identify contributing factors within key sources/sectors of air pollution in the region, and create mechanism for developing a collaborative apparatus to address it.
- Ideate, build, agree on practical and customised solutions for cleaning transport sector of the region.
- Identify key challenges for cleaner transition in the existing industry of the region and its requirement in terms of financial, technological and regulatory support to reduce industrial emission impact on the air quality of our cities.

The national conclave on clean air for the Indo-Gangetic plain shall have three expert technical sessions. The first technical session will be on **Regional Collaboration and Integrated Clean Air Action Plan for the Gangetic plain** for the three states—Uttar Pradesh, Bihar and Jharkhand. **The technical session involves representatives from all three Pollution Control Boards, senior scientists, academicians and think-tanks.** The discussion will explore possible engagement and collaboration areas among all three state governments and Union Government; and shall also identify scope and capacity to develop a regional clean air action plan for the Gangetic plain involving these three states.

“The transport sector requires short/medium term measures to reduce its emission profile by way of traffic management, better fuel standards, decongestion of roads, depletion of 15-year old vehicles, and an effective system of Pollution Under Check (PUC) certification”

The second technical session will be on **transport sector and the possibility of a cleaner transition of the sector with reduction in its particulate emission profile.** The National Urban Electric Mobility Mission by the Union Government is supposed to be introduced by the end of this year, which aims to have a national fleet of electric-powered vehicle. The second session for the conclave will explore its implication on cleaner transition and the kind of shift needed in infrastructure, market and regulatory mechanism. Apart from the long-term shift toward electric vehicles, the sector also requires short to medium term measures to reduce its emission profile in the form of traffic management, better fuel standards, deconges on of roads, depletion of 15 years old vehicles, and effective system of Pollution Under Check (PUC) certification. The panel will have experts of national and international repute who possess wide-range of understanding on cleaner transition of transport sector.

**The third and final technical session will be on clean industry with focus on key sectors of the regions, like power, real-estates, brick-kiln and health implication of the sectors' emission on population.** The discussion shall cover emission impacts on health due to biomass burning, and plausible market-level innovation for clean cooking beyond LPG access. The panel will comprise of experts from government and non-government stakeholders, and will explore the key challenges for cleaner transition in existing industries of the region, and the required financial, technological and regulatory support to reduce industrial emission impact on public health of region population.



# Inaugural Session

10:00–11:20 am

## BACKGROUND

The Inaugural Session will be kickstarted by Mr. Ramapati Kumar, CEO, CEED. The inaugural keynote address shall be delivered by Honourable Deputy Chief Minister and Environment Minister of Bihar, Shri Sushil Kumar Modi and special keynote addresses by Honourable Environment Minister of Uttar Pradesh and Jharkhand, and Dr. Shaibal Gupta, Member-Secretary, ADRI. The Member Secretaries of State Pollution Control Boards of UP, Bihar and Jharkhand shall also be present in the session. The Inaugural Session entails to highlight the significance of a regional collaboration on a clean air action plan between the three states, and to pave way for further detailed discussion in the respective Technical Sessions, thereafter.

## Technical Session 1

# Lending Hands: Regional Collaboration for Clean Air Action Plan in the Indo-Gangetic Plain

11:40 am– 1:00 pm

## BACKGROUND

Released in the year 2016, WHO report confirms that 10 out of 20 most polluted cities in the world are Indian cities and all of them are in the Indo-Gangetic plain. This is an unprecedented and alarming situation for public health and economic growth of the region with such severe levels of air pollution. 35 million people across 29 cities and 48 towns spread across 12,500 sq. km long Gangetic river basin in northern India are exposed to severe levels of air pollution. **The Indian cities listed in the top 20 most air polluted cities of WHO report are Allahabad, Gwalior, Patna, Raipur, Delhi, Ludhiana, Kanpur, Khanna, Firozabad and Lucknow.** While the pollution levels are not restricted to urban areas only, the rapid increase in pollution levels in these cities can be attributed to rising anthropogenic sources, and is strongly related to unplanned and ill-managed urbanization.

“Air pollutants are transboundary pollutants, and travel hundreds/thousands kms and adversely impacts health & livelihood of the region far removed from the point of emission”

Last year, the smog over Delhi and its adjoining areas in the National Capital Region (NCR) after Diwali is one such example, where the main cause of the deadly smog, as confirmed by satellite imageries released from NASA, was stubble burning in neighbouring states of Haryana, Punjab and Western Uttar Pradesh. Immediate actions were taken under emergency response by Union Government, Government of NCT of Delhi and government of neighbouring states under their jurisdiction, including closing down of Badarpur coal powerplant, postponing construction activities for a week, banning waste burning with punitive action, vacuuming of road dust and water sprinkling on roads in Delhi and NCR regions. Despite these actions, the pollution levels did not decrease and persisted over prolonged period; even though the visible smog depleted after a week. Since then, the debate has gathered momentum on the need of regional cooperation for clean air action plan. Addressing rising air pollution through mitigation strategies shouldn't

be under 'state jurisdiction' of emitting area, but a 'shared responsibility' of all areas in the vicinity, where the emission is likely to impact. **At this point, the concept of "Regional Cooperation" and "Integrated Clean Air Action Plan" is important to ensure proper coordination and collaboration between state governments** to serve as a valuable tool that not only improves sharing of scientific understanding on air pollution, but also designs and implements long-term mitigation strategies. The coordinated mitigation strategies assist in creating tangible impacts. Several recognised steps have been taken in the past by all the three state governments in isolation. However, they fail to create a significant impact on air pollution, largely due to the uncontrolled nature of pollutants, as well as pilferages of violators and polluters from one state to other. To quote as an example, the Bihar Government ordered existing brick-kiln manufacturers in and around Patna to shift to more sustainable technologies; but due to lack of coordination, many of these brick-kiln manufactures moved to neighbouring states, exploiting lack of similar orders. Such is also the case with phasing out 15-year old vehicles. Therefore, it is imperative that regional cooperation and coordinated strategies for key priority sectors (transport and brick-kiln units) are established to improve the air quality. Since, an integrated action plan is absolutely essential, improved real-time data monitoring and open access of data generated must also be encouraged. The monitoring of data helps in understanding the trend, identifying the episodic events and planning mitigation measures. Further, it also serves as a **valuable tool to understand the impact of implemented mitigations and the regular monitoring and repository of data is a prerequisite for source apportionment study**. The existing air quality monitoring status in the entire Indo-Gangetic belt is in a dismal state, and is insufficient to serve these purposes. Only 78 manual monitoring stations are installed in the states of Bihar, Jharkhand and Uttar Pradesh cumulatively, to capture air pollution data of the region, and only 11 cities have monitoring station to perform real-time monitoring. Also, none of the three states follow the practice of forecasting pollution trends. Monitoring of data for pollution levels is crucial for the issuance of health advisory, and to understand trends and identify episodic events.

**This technical session initiates a discussion on regional cooperation, integrated clean air action plan for Bihar, U.P. and Jharkhand**

The technical session on "Lending Hands: Regional Collaboration for a Clean Air Action Plan in Indo-Gangetic Plain" initiates a discussion on the 'regional cooperation', 'integrated clean air action plan' and multi-stakeholder process for the states of Bihar, Uttar Pradesh and Jharkhand to reduce its air pollution levels by encouraging cleaner technology for brick-kiln units, developing inter-state coordination platform for the issuance of health advisory, enhancing scientific support for pollution control, and appropriating ordinance to regulate plying out of old vehicles. The discussion will also focus on increasing monitoring and pollution forecast through SAFAR. **The panel brings together Member Secretaries/Senior Officials from pollution control boards of all three respective states, along with the Honourable Mayor of Patna, and eminent scientists working on the issues related with air pollution.**



## Technical Session 2

# Stepping-up a Gear: Paving a Roadmap For A Cleaner Transition in the Transport Sector

2:00–3:00 pm

## BACKGROUND

Being the fourth largest automobile manufactures in the world, and with an on-road fleet of over 25 million motor vehicles , **the Indian road transport sector is the fastest-growing component of country's infrastructural sector.** In 2017 itself, while the overall economic growth has been sluggish, the sector is growing at 6.1% in real term. It is seen as a catalyst of economic growth in the country, carrying 90% of passengers' traffic and 65% of freight movement. Cognisant of the need to create an adequate road network to cater to the increased traffic and movement of goods, the Government of India has earmarked 20% of the investment of US\$ 1 trillion reserved for infrastructure during the 12<sup>th</sup> Five-Year Plan (2012–17) to develop the country's roads. However, the Indian road transport sector is also seen as the main driver for unprecedented environmental crisis in the form of rising air pollution in Indian urban landscape. Among the 20 most polluted cities in the world identified by WHO, more than half of the cities in the list are in India; including small cities like Gwalior and Allahabad that have higher pollution levels over megacities like Delhi and Mumbai. **India is at a critical juncture where public health of its urban masses is severely at risk with expansion of its road transport infrastructure at its peak.**

“Road transport sector is the main driver for unprecedented environmental crisis in the form of rising air pollution in Indian urban landscape”

While the road transport sector is not the singular cause of rising air pollution in Indian cities, its contribution, notwithstanding, is quite massive. The Indian road transport sector accounts for about 18–20% of particulate matters emission, if we measure PM10 emission. However, if we move from PM10 to PM2.5 (finer particles), the share of transport sector's emission increases. **A source apportionment study conducted for the city of Bangalore suggests the road transport sector as the single largest source in this non-industrial city.** However, the lack of data for emission inventory and source profiling of road transport sector for cities of Indo-Gangetic plain acts as a hindrance for any specific management and mitigation plan to address the rising air pollution through transport sector.

Except Delhi, no other city in this region has source apportionment study or emission inventory profiling to ascertain the level of impact through transport sector on air pollution in this region. **The road transport sector is plagued with multiple issues at technological, regulatory and policy level which is accelerating its impact on air pollution levels in Indian cities, especially in cities situated in the Indo-Gangetic plain.**

“The cities in the Indo-Gangetic region need to be decongested by reducing the number of private vehicles and by introducing integrated public transport”

One of the major issues is highly congested roads in these cities due to exponential growth of private vehicles in the last couple of decades. Apart from rising affluence/economic progress, lack of effective and convenient public transport can be seen as the major reason for high growth of private vehicles in these cities. The trend prevails that if one has to travel quickly and conveniently in cities like Patna, Ranchi and Varanasi, one must own a vehicle, given the shoddy state of public transport in these cities. Due to narrow width and high number of motorised and non-motorised vehicles, the roads in these tier-2 cities have bottleneck traffic that leads to heightened emission of particulate matters from vehicle sources. The cities in the region need to be decongested by reducing number of private vehicles and introduction of integrated public transport. However, the integrated public transport shouldn't be one-fits-for-all kind, otherwise the whole purpose of it shall be defeated. Also, the public transport system in tier-2 cities shouldn't be modelled on the basis of megacities like Delhi and Mumbai, and ought to be customised as per the needs of these cities. Public transport should be affordable, while being convenient and accessible for all sections of the society including the affluent masses.

The differential pricing of fuel (diesel and petrol) was expected to create a shift of consumer choice towards diesel driven vehicles. However, this doesn't seem to be effective, since the sale of SUVs has increased in the recent past, which are mostly diesel-powered. Therefore, **it is necessary to evaluate whether the differential pricing is enough to create a shift or a higher levy and tax is required for private vehicles with more than 2000 CC** (as followed in Delhi), to establish a polluter pay principle in case of growing ownership of private vehicles. Another important aspect of the road transport sector in tier-2 cities, particularly in the Indo-Gangetic plain, in relation to air pollution, is the lack of enforcement on phasing out 15-year old vehicles. Unlike Delhi, where such enforcement exists; cities like Patna, Varanasi, Lucknow, Kanpur and Ranchi, do not have any regulation to phase out 15-year old vehicles, while the abundance of it on the roads remain unabated. There are also several cases of these phased out vehicles of Delhi are used in these

cities as 2<sup>nd</sup> generation vehicles with new registration. A strict enforcement along with stronger penalty for violation is required to phase out these vehicles from the Indian roads completely. **Use of adulterated fuels in public transport, mostly in auto-rickshaws and carriage vehicles, is a major cause for rising air pollution levels in these cities.** The Bihar State Pollution Control Board issued a direction in this regard to take action against such vehicles, but due to high number of such vehicles, the enforcement is still lagging.

Pollution Under Check (PUC) certification was seen as a full-proof tool to check emission from the vehicles. However, our assessment in Patna and other cities suggests that the PUC process is in a dismal state; and anyone can procure PUC certificate, even without taking their vehicle for the necessary test. The PUC process requires a make-over with a new approach and strong quality control on agencies/franchises that certify vehicles. **The Union Government is slated to come up with new National Urban Electric Mobility Mission later this year, with focus on all-electric vehicle fleet by 2030. While engaging with the team preparing for this mission, we learnt that the first phase will include electric buses, e-taxis, e-autos and e-rickshaws, along with a complete transformation of electric vehicles of taxi aggregators like UBER and OLA.** Converting all-fleet to electric powered, will result in defossilization of Indian roads to a large extent. However, adding massive number of all types of electric vehicles meant for public transport, without reduction in private vehicles and diesel-powered public transport vehicles, will create chaos on already congested Indian roads. Therefore, it is imperative to phase out older diesel-powered public transport vehicles, alongside introducing new similar electric powered vehicles. A possibility to discourage high capacity diesel powered private cars after bringing electric cars in Indian market must also be assessed. We also necessarily address the massive infrastructure and logistic step-up for battery-swap and battery charging for electric vehicles.

“It is imperative to phase out older diesel-powered public transport vehicles, alongside introducing new similar electric powered vehicles”

Therefore, the second technical session, “Stepping-up a Gear: Paving Roadmap for a Cleaner Transition in the Transport Sector” is an attempt to discuss and find plausible effective ways to ensure cleaner transition of road transport sector in the Indo-Gangetic region, and reducing its impact on air pollution of the cities of the region. **The panel will explore all the issues highlighted under the subject to suggest new solutions suited to the region, and help identify areas of collaboration between state pollution control boards and government departments of all three participating states,** as well as the non-state stakeholders in order to chalk-out a regional clean air action plan involving Uttar Pradesh, Bihar and Jharkhand.

### Technical Session 3

# Cleaning Chimneys: Towards Clean Industry and Mitigating Health Impacts of Industrial Air Pollution

3:15–4:15 pm

## BACKGROUND

The air pollution in the Indo-Gangetic basin is generally acknowledged to be chronic and severe because of a combination of factors including geographical, meteorological and the presence of high intensity emission sources. There are a number of sources which contribute to toxic emissions which eventually deteriorate the quality of air in North India. **The contribution of residential open traditional stove cooking, power plants and brick-kiln industries to the emission inventory can range between 10 and 20 percent in this region, and are usually the major contributors.** The energy supply in the Indo-Gangetic region primarily depends on the conventional energy generation resources like coal for electricity and biomass (firewood and charcoal) to meet the energy needs of 35 million people in Uttar Pradesh, Bihar and Jharkhand. These resources are however, inefficient and polluting. In the electricity sector, the region continues to depend mainly on coal based thermal power plant to meet the growing electricity demand. There are 28 thermal power stations (new and old) that are located in this region. Coal power plants are said to be one of the biggest contributor of air pollution in the adjoining cities due to transboundary movement of particulate matter with favourable wind direction.

“Residential open traditional stove cooking, power plants and brick-kiln industries contribute 10–20% to the emission inventory”

Many reports suggest that particulate matters generated through coal power plants can impact air quality of the region within 100 km of its periphery. Coal power plants not only induce climate change, but also cause local air pollution in the respective cities and neighbourhood. In 2015, the Ministry of Environment and Forest had pulled the strings on coal-based thermal power plants, yet no considerable progress has been made towards controlling the emissions from these coal power plants. Many groups feel that these emission standards should be further strengthened. Also, optimum replacement of power supply from coal based power plants to clean and sustainable renewable energy resources, and reduction of the number of coal power plants in the region can also be explored as a

**plausible solution.** Although the Indo-Gangetic region is not heavily industrialised, there are several small and medium enterprises that add to the growth trajectory of this area. Among these, the brick-kiln industry stands important from the air pollution perspective because of its high emission profile, and the large number of brick-kiln units in the states of Bihar, UP and Jharkhand. **The brick-kiln sector is one of the key sources for deteriorating air quality in this region.** The conditions became worse enough for the Bihar State Pollution Control Board to order closure of the brick-kilns in Patna and Patna Urban Agglomeration, 2 years ago. **With emergence of sustainable and non-polluting technology for brick making, there is imminent possibility of cleaner transition. However, this transition requires massive financial and technological investment, as well as water tight regulatory framework to incentivise these transitions.**

“This technical session offers a holistic interactive session to generate solutions for sustainable & clean transition for industries to ‘RepAir our Cites’ for our future generations.”

CEED firmly believes that the emission issues pertaining to the above mentioned sectors must be quickly addressed to mitigate the air pollution levels. **The proposed technical session on “Cleaning Chimneys: Towards Clean Industry and Mitigating Health Impacts of Industrial Air Pollution” will be a platform to identify key challenges for cleaner transition for existing industries of the region** and the required financial, technological and regulatory support to reduce industrial emission impact on the air quality. Thus, by bringing together key industry representatives, researchers, practitioners and think-tanks, the technical session shall offer a holistic interactive session to generate solutions for sustainable clean transition for industries to ‘RepAir our Cites’ for future generations.

# Emission Standards for Thermal Power Plants

## TPPs (units) installed before 31<sup>st</sup> December, 2003

PARAMETER	STANDARD
Particulate Matter	100 mg/Nm <sup>3</sup>
Sulphur Dioxide (SO <sub>2</sub> )	600 mg/Nm <sup>3</sup> (units smaller than 500MW capacity units)  200 mg/Nm <sup>3</sup> (for units having capacity of 500MW and above)
Oxides of Nitrogen ( NO <sub>x</sub> ) 600 mg/Nm <sup>3</sup>	600 mg/Nm <sup>3</sup>

## TPPs (units) installed after 1<sup>st</sup> Jan 2003 upto 31<sup>st</sup> Dec 2016

PARAMETER	STANDARD
Particulate Matter	50 mg/Nm <sup>3</sup>
Sulphur Dioxide (SO <sub>2</sub> )	600 mg/Nm <sup>3</sup> (units smaller than 500MW capacity units)  200 mg/Nm <sup>3</sup> (for units having capacity of 500MW and above)

## TPPs (units) to be installed from 1<sup>st</sup> January 2017

PARAMETER	STANDARD
Particulate Matter	30 mg/Nm <sup>3</sup>
Sulphur Dioxide (SO <sub>2</sub> )	100 mg/Nm <sup>3</sup>
Oxides of Nitrogen (NO <sub>x</sub> )	100 mg/Nm <sup>3</sup>

## Emission Standards for Brick-Kiln Units

### TPPs (units) to be installed from 1<sup>st</sup> January 2017

CATEGORY	STANDARD
<b>Bull Trench Kiln</b>	
Small	1000 mg/Nm <sup>3</sup>
Medium	750 mg/Nm <sup>3</sup>
Large	750 mg/Nm <sup>3</sup>
Down Draft Kiln (applies to all scales)	1200 mg/Nm <sup>3</sup>
Vertical Shaft Kiln (applies to all scales)	250 mg/Nm <sup>3</sup>

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