

# **Technology Challenge for Identifying and Promoting Solutions for Mitigating Ambient Air Pollution**

**Start Date** – December 01, 2020

**End Date** – March 15, 2021

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## **1. Context**

Rapid urbanization in the country is putting incessant pressure on ambient air quality in the cities. Air quality management in dense urban pockets becomes a challenge for city agencies. Air pollution is known to impact human health and the International Agency for Research on Cancer (IARC) classifies outdoor air pollution as a carcinogen to humans.

In pursuit to maintain optimum air quality for the citizens, Ministry to Environment Forests & Climate Change (MoEF&CC), Government of India, has notified National Ambient Air Quality Standards (NAAQS) in 2009 indicating threshold limits for pollutants in ambient air. Megacities are becoming congested, clogged, polluted. The Central Pollution Control Board (CPCB) has identified 122 such cities termed as non-attainment cities which exceed the prescribed NAAQS based on air quality data from 2011-15 and 2014-18.

Land-use in Indian cities is primarily mixed where activities are located close to each other for easy accesses to amenities. While this is a component of good urban development, at the same time, management of ambient air quality in many urban pockets is increasingly becoming a challenge in Indian cities due to congested spaces in high-density urban areas and emissions caused by various types of commercial and industrial activities and encroachments. There are cases when residential areas have come up near industrial and/or commercial hubs due to lack of/inadequate capacity for urban planning. High number of small-scale units inside residential areas, continuous construction activities also lead to increase in population exposure to air pollution.

Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) is a concern in Indian cities, especially those situated in the Indo Gangetic Plain (IGP) due to aerosols from alluvium plains and anthropogenic activities in several million plus cities located in the IGP. The landlocked IGP surrounded by the Himalayas in the north and the Thar desert in the west stays polluted, particularly during winter season, when pollution levels go up on account of increased emissions from local sources, biomass burning including paddy stubble, festivals and unfavourable meteorological conditions resulting in poor dispersion of pollutants. City specific action plans targeting major air polluting sources specific to the city are being prepared and implemented in all non-attainment cities. Control of anthropogenic emissions have been discussed at all levels and

sustainable technological solutions are the need of the hour along with improved urban air quality management practices.

## **2. The Challenges of Providing Clean Air in Urban Hotspots**

Air quality management approach primarily revolves around controlling emissions at source which is a more cost-effective solution. In the same breath, the scientific community argues for developing technologies for *in situ* pollution control at the level of ambient air.

Increasingly a greater number of city administrations are deploying *in situ* controlled solutions to deliver cleaner air in high pollution zones also known as hotspots. A few such examples are patented positive ionization air purification unit by Daan Roosegaarde in Beijing, large air purification tower in Xian, CityTree in Oslo, Paris, Brussels and Hong Kong, photocatalytic concrete/ tiles in Mexico, and WAYU in Delhi. Although efficiency of such systems is not yet well-documented, need for innovative measures to manage urban air quality issues cannot be undermined.

In the current scenario, the overall financial sustainability of procuring and operating present cost intensive solutions is also a challenge for the city administration.

## **3. The Technology Challenge**

Proposals are invited by CPCB from interested innovators, individuals, consortium partners, companies, academic institutions, research and development centres, civil society organisations (NGOs), parastatals or municipal bodies, to provide innovative technical solutions for control/ abatement of urban ambient air pollution for *in situ* pollution control.

### **Aim**

**The Technological Challenge aims to:**

Scope, scale and foster – technological and business solutions to control/ abate urban ambient air pollution.

### **Objectives**

- Identify technological as well as business process innovations.
- Endorse viable business models that are suitable for a different size, geographies, and class of cities.
- Pilot test and handhold to scale the shortlisted technologies/solutions in select project cities.
- Bridge the gap between innovators/manufacturers and beneficiaries- i.e. urban local bodies (ULBs), citizens

## **4. Expectations from the Challenge**

The proposed challenge invites solutions that address high pollutant levels often observed in urban spaces in the most efficient and cost-effective manner. Improvement of air quality in high emission zones also termed as hotspots is the ultimate goal of this Challenge.

In order to address urban air quality issues, technological solutions are crucial. At the same time, it is imperative that any technological solution will have a handling mechanism and business model. Therefore, the proposed solutions which address the Whole-Of-System that covers the entire process chain starting from the cleaning of ambient air until safe treatment or disposal of any waste generated and the related life cycle costs shall be given preference. Proposed solutions should offer value addition by highlighting potential of recycling and reuse, energy efficiency and conservation.

Participants are encouraged to provide technology solutions that address the problems by augmenting already available technologies in the market, and propose robust business models for collection/ suppression of dust generated, management of dust collected in high dust emission zones in a cost-effective manner in Indian cities.

### ***Essential elements of the submitted proposals***

Each proposal needs to cover following dimensions

- **Technologies:** Ambient air purification – Sustainable, low maintenance, energy efficient, address fine particulate pollution, relevant to local environment, safe for human and ecosystem health. Dust collection/ suppression systems - Portable, low cost, low maintenance, miniature (it may not necessarily be a new invention, to fit in right of way constraint), modular, energy efficient, contextualized and user-friendly.
- **Operational Models:** Cradle to grave approach, safe removal, and disposal of any waste generated by ensuring health and hygiene aspects of operation and maintenance workers as well as public at large. **Business Models:** sustainability for revenue generation, private sector engagement, and procurement process

## **5. Eligibility Criteria to Participate in the Challenge**

The applicant must meet following key criteria to be eligible to participate in this Challenge.

1. An entity, which can be an individual, consortium partners, companies, academic institutions, research and development centers, civil society organisations (NGOs), parastatals or municipal bodies, who can implement the solutions at a pilot scale.
2. The proposed solutions must have been tested and certified by an accredited laboratory, and/or endorsed by reputed national institutes like Indian Institute of Technologies (IITs), National Environmental Engineering Research Institute (NEERI) and other national laboratories.

## 6. Evaluation Process and Criteria

For evaluation and scrutiny of the technological solutions submitted by the participants, a jury shall be constituted from among experts from the Ministry of Environment Forests & Climate Change, faculty from IITs/NEERI/ CSIR Institutes and representatives of leading civil society groups.

The following broad criteria shall be adopted by the jurors for evaluation of the proposals.

- a) ***The operational effectiveness of the Technology (Ambient air purification and Dust collection or suppression)***: -The efficiency of the technology shall be measured with respect to
  - Effectiveness.
  - Clean air delivery vis-a-vis cost.
  - Energy efficiency.
- b) ***Life of product/ Durability***: Low life cycle cost (including operation and maintenance cost).
- c) ***Ease of use (automation)***: The technology shall be evaluated for the ease of use. The learning curve of the technology has to be relatively short and it should be intuitive, hence facilitating easy use and quick deployment.
- d) ***Ease of availability/Economies of scale***: The technology shall be evaluated for
  - Replicability and scalability.
  - Should have a good business model that facilitates easy procurement and deployment of the technology.
- e) ***Adaptability/Versatility***: The technology should be versatile enough to be used
  - In-varied terrains and geo-climatic conditions.
  - Adaptable to the diverse needs of the end user.
  - Combination technologies i.e. operations supported by IT based monitoring, provided as one efficient package etc.

The proposal should provide details of assumptions considered for product design and envisaged processing and disposal system of waste.

- f) **Made in India:** Technologies using equipment parts easily available in the local market should be given preference.
- g) **Environmentally Sustainable:** The technology should not adversely affect the natural environment (surface, groundwater, flora, and fauna) over the period of its usage.

The proposals will be evaluated based on the following evaluation matrix.

S.no	Weightage Criteria	Weightage (%)
1	Operational effectiveness* (in ambient air purification and dust collection/ suppression systems)	25
2	Durability	20
3	Ease of Use	20
4	Ease of Availability / Economics of scale	15
5	Adaptability / Versatility	10
6	Made in India	5
7	Environmental Sustainability	5
Total		<b>100</b>

*\*The entity will have to demonstrate the solutions to the jury through field-testing in Delhi-National Capital Region (NCR).*

The entity shall be responsible to ensure safety measures and precautions required during the field-testing/ demonstration stage.

## 7. Categories

The Challenge shall be conducted for two separate categories.

**Category A**-Technological solutions for ambient air purification in hotspots.

**Category B**-Technological solutions for dust collection/ suppression systems.

Successful entries of the Challenge will be eligible for the following

i) Cash awards as under-

Categories	1 <sup>st</sup> Prize	2 <sup>nd</sup> Prize	3 <sup>rd</sup> Prize
<b>Category A</b>	₹5.00 Lakhs	₹3.00 Lakhs	₹2.00 Lakhs
<b>Category B</b>	₹5.00 Lakhs	₹3.00 Lakhs	₹2.00 Lakhs

ii) Selected proposals will be provided an opportunity to pilot test the solution in select cities in India. During the pilot test period, mentoring support will be provided.

## 8. How to Participate in the Challenge

The Challenge is open to all. Any individual technology developer, academic and research institute, private or public firm, non-governmental organization can participate in the Challenge. Interested applicants can fill up the application form available at following web portal. The Challenge will remain open from 10:00 Hrs on 01 December 2020 to 17:30 Hrs on 15 March 2021.

Detailed Application Form is available at [Annexure 1 & 2](#)

For further information related to the challenge, address your queries to [mscb.cpcb@nic.in](mailto:mscb.cpcb@nic.in) and or [techchallenge.cpcb@gov.in](mailto:techchallenge.cpcb@gov.in)

## Annexure – 1: Application Form

### **General Information**

1. First Name Middle Name Last Name
  
2. Designation
  
3. Contact details -  
  
Mobile No Email ID Web Address
  
4. Alternative contact detail –*(format as above)*
  
5. Address – *(Four lines with pin code)*
  
6. Country of Origin -
  
7. Identity of the applicant/s
  - ✓ *Individual*
  - ✓ *Consortium Partners*
  - ✓ *Companies*
  - ✓ *Firm (manufacturer/supplier)*
  - ✓ *Academic Institutions (Colleges/University)*
  - ✓ *Municipal bodies/Parastatal agencies*
  - ✓ *R&D center*
  - ✓ *Civil Society Organisations (NGOs)*
  
9. Name of entity -
  
10. Establishment year (in case of Firms/ Civil Society Organisations (NGOs))
  
11. Registration details (in case of Firms/ Civil Society Organisations (NGOs))
  
12. Resume /CV of primary contact



## **Proposals**

1. Explain the integrated solution that you are offering to address the Challenge. The integrated solution refers to technological solutions and robust business plan covering the life cycle of equipment to implement it in Indian cities (*2-3 pages*). The proposal should provide details of assumptions considered for product design and envisaged processing and disposal system of waste.
2. Patent details and technical specifications of your technology product/prototype (*1 page*)
3. If pilot tested in any cities, provides details (*1 page*). If tested in Indian cities (*1 page*).
4. Please provide detailed documentation of your proposal including process diagrams, drawings, photographs of the prototype/technology product clearly showing brand name, no. etc. (*XX MB*)
5. Video of the prototype/technology – clearly showing functional aspects, preferably testing on the ground (*XXMB*). Please avoid including marketing video.
6. Copy of registration details of the firm

## **Annexure – 2: Self-Declaration**

I/We hereby declare that we abide by all rules and regulations set up by the organizers of this Challenge. I/We declare that the technology/businessplan/process submitted in this Challenge do not have any legal issues/concerns since its inception. By merely participating in this Challenge does not mean any assured support/obligations towards me/us from the organizers of this Challenge.

***Name:-***

***Date:-***

***Place:-***

## **Annexure 3:**

### **Frequently Asked Questions (FAQ)**

- 1. What is the deadline to apply for the Challenge?**
  - a. The Challenge will remain open from 10:00 Hrs on 01 December 2020 to 17:30 Hrs on 15 March 2021.
- 2. How do I apply for the challenge?**
  - a. Detailed Application Form along with instructions is available at [Annexure 1 & 2](#) of the document
- 3. Will you provide guidance on an application before I submit it?**
  - a. Individual guidance will not be provided on ideas either before or after submission. The applicant should decide if the idea meets the criteria of the challenge. For further information related to the challenge, address your queries to [mscb.cpcb@nic.in](mailto:mscb.cpcb@nic.in) or [techchallenge.cpcb@gov.in](mailto:techchallenge.cpcb@gov.in)
- 4. Can I edit my submitted form?**
  - a. Yes. The applicant may edit and resubmit the applications at any time prior to the close of the application date.
- 5. Who is eligible to apply for the Challenge?**
  - a. An entity, which can be an individual, consortium partners, companies, academic institutions, research and development centers, civil society organisations (NGOs), parastatals or municipal bodies, who can implement the solutions at a pilot scale.
  - b. The proposed solutions must have been tested and certified by an accredited laboratory, and/or endorsed by reputed national institutes like Indian Institute of Technology (IIT), National Environmental Engineering Research Institute (NEERI) etc.
- 6. How will I know about the selection of my application?**
  - a. An email will be sent to applicant post successful submission of the application. Upon shortlisting of the applications, the applicants shall be intimated via email.
- 7. What is the review process for the challenge?**
  - a. An initial screening to check the eligibility, appropriateness of the technology and legal and financial capability to address the problem described in the challenge;

- b. A select panel of jurors will review the shortlisted applications and will evaluate the proposals against predetermined parameters;
- c. Field-testing of the selected solutions shall be done to check their effectiveness in real life conditions.

**8. What are the benefits to the winner of this Challenge?**

- a. The winners will be awarded cash award. In addition, successful entries will be provided an opportunity to pilot test the solution.

**9. Is there any application fee?**

- a. There is no fee for submitting the application.