



THE UNIVERSITY OF CHICAGO  
**EPIC** ENERGY POLICY  
INSTITUTE

India

Post-Event Report

# Driving Change:

## Innovations in Vehicular Pollution Monitoring

January 30, 2025  
The Claridges,  
New Delhi





# Contents

Background	_____	<b>01</b>
Introductory Remarks	_____	<b>02</b>
Session 1 Brief	_____	<b>03</b>
Session 2 Brief	_____	<b>04</b>
Session 3 Brief	_____	<b>05</b>
Closing Remarks & Next Steps	_____	<b>06</b>
Speaker Bios	_____	<b>07</b>



# Background

Delhi's air pollution crisis remains one of the most pressing environmental challenges, with vehicular emissions playing a significant role. To address this issue, a high-level event titled *"Driving Change: Strengthening Vehicular Emission Monitoring & Governance"* was organized, bringing together key stakeholders from the government, research institutions, and industry.

Hosted by Energy Policy Institute at the University of Chicago (EPIC-India), the event aimed to foster discussions on advanced monitoring techniques, regulatory reforms, and policy interventions to mitigate vehicular pollution.

The event featured three insightful sessions focusing on governance, technology-driven enforcement, and policy recommendations. Experts from the Ministry of Road Transport and Highways (MoRTH), the Commission for Air Quality Management (CAQM), Transport Department, Government of NCT of Delhi (GNCTD), think tanks, and academic institutions engaged in discussions on enhancing the effectiveness of pollution monitoring mechanisms such as Pollution Under Control Certificates (PUCC), remote sensing, and Automated Testing Stations (ATS).



**Dr. Kaushik Deb**  
Executive Director, EPIC-India

# Introductory Remarks

## **SPEAKERS:**

- **Dr. Kaushik Deb**  
Executive Director, EPIC-India
- **Dr. Virinder Sharma**  
Member Technical, CAQM

The event commenced with introductory remarks emphasizing the need for robust policy-backed solutions for vehicular emissions. Dr. Kaushik Deb provided an overview of EPIC-India's research-based approach to policy engagement, stressing the need for evidence-based interventions in air quality management. He highlighted how data-driven strategies can help policymakers make more informed decisions and underscored the importance of partnerships between government bodies, research institutions, and civil society for effective policy implementation.



**Dr. Virinder Sharma**  
Member Technical, CAQM

Dr. Virinder Sharma outlined CAQM's recent directives on emission control, stressing the need for transformative shifts beyond incremental measures. While discussing PUC 2.0, ATS expansion, and stricter enforcement mechanisms, he acknowledged these as necessary but gradual steps.

He highlighted the importance of automated vehicle testing and stricter emissions monitoring, alongside innovative solutions like remote sensing and AI-driven compliance checks to address enforcement challenges.

He also underscored the potential of electric vehicles as a clean mobility solution and the critical role of the PUC model in emission control, presenting a forward-looking perspective on policy interventions.

# Session Briefs

## Session 1: Examining the Governance of Vehicular Emissions



### **MODERATOR:**

- **Ms. Tanushree Ganguly**  
Director, Air Quality Life Index (AQLI)

### **SPEAKERS:**

- **Ms. Anumita Roychowdhury**  
Executive Director, Centre for Science and Environment (CSE)
- **Dr. Sachin Shinde (IAS)**  
Special Commissioner, Transport Department, GNCTD

# Key Takeaways



## **Insights from Ms. Anumita Roychowdhury's presentation on Imperatives of on-road emissions monitoring:**

Ms. Roychowdhury stressed the need to move beyond traditional PUC mechanisms and integrate real-time emissions monitoring solutions like remote sensing.


She highlighted the importance of preventing tampering with advanced emissions control systems and advocated for stringent checks and penalties to hold vehicle owners accountable. The session underscored the complexity of pollution governance, emphasizing that effective policy enforcement must be complemented by technological innovation to ensure sustained emissions reductions on the road.

*"We must move beyond traditional PUC mechanisms. Without real-time monitoring and strict enforcement, pollution control remains ineffective."*



## **Insights from Dr. Sachin Shinde's (IAS) presentation on Enhancing PUC Implementation in Delhi:**

Dr. Sachin Shinde underscored the pressing environmental threat posed by end-of-life vehicles and the critical need for public awareness to improve PUC compliance.



He acknowledged that ANPR technology at petrol pumps has improved monitoring but noted enforcement gaps, emphasizing that full-scale implementation requires inter-agency coordination, better data integration, and overcoming legal and operational challenges.

Dr. Shinde stressed that institutional reforms are essential to ensure transparency and efficiency in enforcement mechanisms. Strengthening coordination between transport, municipal, and traffic authorities, he noted, is crucial for scaling these efforts and ensuring long-term compliance with emission regulations.

*"A fragmented approach to emission control will not work. We need a single-window system where all enforcement agencies collaborate effectively."*

## The Road Ahead

- **Integration of Remote Sensing with Enforcement:** A consensus emerged on leveraging remote sensing technology for real-time, on-road emissions monitoring to complement the PUC system through data-driven, on-ground pollution control.
- **Policy Continuity & Accountability:** Emphasized the necessity of long-term policy commitment and clear accountability frameworks for pollution monitoring agencies.
- **Inter-Agency Coordination & Public-Private Partnerships:** Strengthening collaboration across government bodies and industry stakeholders was identified as essential for scaling up pollution monitoring solutions effectively.



## Session 2: Exploring Pathways to Enhance Monitoring of Vehicular Pollution

### MODERATOR:

- **Dr. Urmila Chatterjee**  
Executive Director, Data, Policy & Innovation Centre (DPIC)

### PANELISTS:

- **Shri. Mahmood Ahmed**  
Additional Secretary, Ministry of Road Transport and Highways
- **Shri. Tim Gould**  
Chief Energy Economist, International Energy Agency (IEA)
- **Shri. Anirudh Narla**  
Researcher, International Council on Clean Transportation (ICCT)

# Moderator's Opening Remarks and Key Questions



**Dr. Urmila Chatterjee**  
Executive Director, DPIC

Dr. Urmila Chatterjee set the stage by stressing the importance of data-driven emissions monitoring and enforcement. She posed critical questions to the panelists regarding the effectiveness of existing monitoring systems and how global best practices could be adapted for India's unique challenges.

## Key Takeaways

### **Global Lessons on Vehicle Emission Control:**

Shri. Tim Gould from the IEA presented global best practices, citing Paris as a successful example where emission zone policies, pedestrianization, and public transport expansion significantly reduced pollution. He emphasized that India can adopt a similarly comprehensive approach by integrating policy reforms, infrastructure development, and robust enforcement mechanisms.



**Shri. Tim Gould**  
Chief Energy Economist, IEA

*"India can benefit from a long-term roadmap that combines technological advancements with firm regulatory actions. The key is policy stability and phased implementation."*

**Findings from Remote Sensing Studies:**

Shri. Anirudh Narla from the ICCT presented key insights from the Delhi-Gurugram pilot study, revealing that diesel vehicles, particularly commercial light goods vehicles (LGVs), are the highest contributors to emissions.

He emphasized the need for policy interventions focused on phasing out pre-BS6 vehicles to accelerate fleet modernization. Highlighting the potential of remote sensing technology, he showcased its effectiveness as a non-intrusive, scalable tool for real-time identification of high-emission vehicles, enabling data-driven enforcement and targeted policy action.

*"Our research underscores the need to prioritize the phasing out of pre-BS6 commercial vehicles and introduce a performance-based taxation system for high emitters."*





## **Government's Perspective on Policy Implementation:**

Shri. Mahmood Ahmed from the MoRTH highlighted the critical need for inter-agency collaboration to enhance pollution control efforts.

He acknowledged that while India is progressing in adopting remote sensing and ATS, scaling enforcement mechanisms and ensuring uniform compliance across states remain key challenges.



**Shri. Mahmood Ahmed**  
Additional Secretary, MoRTH

He stressed the importance of a phased approach to national implementation, addressing both regulatory and technical hurdles.

Despite the slow pace of policy execution, he reaffirmed the government's commitment to integrating advanced monitoring technologies to strengthen vehicle emissions enforcement.

*"The challenge is not just in adopting technology but ensuring that its implementation is uniform across states, reducing inconsistencies in enforcement."*

# The Road Ahead

- The session concluded with a consensus on the need for better integration of remote sensing with on-ground enforcement.
- The importance of policy continuity and clear accountability frameworks for pollution monitoring agencies was emphasized.
- Strengthening inter-agency coordination and public-private partnerships was identified as a priority to scale up monitoring solutions.





## Session 3: Policy & Implementation Roadmap for Emission Control

### **MODERATOR:**

- **Dr. Kaushik Deb**  
Executive Director, EPIC-India

### **PANELISTS:**

- **Shri. Arvind Nautiyal**  
Member Secretary, CAQM
- **Shri. Amit Bhatt**  
Managing Director (India), ICCT
- **Ms. Anumita Roychowdhury**  
Executive Director, CSE

# Moderator's Opening Remarks and Key Questions



Dr. Kaushik Deb set the tone for the discussion by highlighting key gaps in policy implementation and enforcement. He raised critical questions about the most effective interventions to reduce vehicular emissions, the role of multi-stakeholder collaboration in enforcement, and the challenges in scaling up vehicle electrification and scrappage policies.

## Key Takeaways

### **Policy Directions for Emission Reduction:**

Shri. Amit Bhatt emphasized the need for Low Emission Zones (LEZs) and financial incentives to promote cleaner vehicles. Drawing from global case studies, he underscored that LEZs must be complemented by robust public transport infrastructure to provide viable mobility alternatives.



**Shri. Amit Bhatt,**  
Managing Director, India, ICCT

*"LEZs must go hand in hand with expanded public transport networks to ensure accessibility and equity in implementation."*



**Shri Arvind Nautiyal**  
Member Secretary, CAQM

Shri. Arvind Nautiyal outlined CAQM's strategy for strengthening vehicular regulations, emphasizing the necessity of coordinated enforcement across NCR states. He stressed that fragmented regulatory approaches create inefficiencies, advocating for a regionally integrated strategy.

*"A uniform regulatory framework across NCR is essential to ensure consistent enforcement and reduce implementation gaps."*

### **Challenges in Implementation:**

Ms. Anumita Roychowdhury identified the lack of centralized enforcement mechanisms and insufficient data integration as major barriers to effective emission control. She advocated for real-time emissions tracking to enhance compliance and reduce human intervention in enforcement.

*"A data-driven emissions monitoring system, integrated with enforcement measures, is key to eliminating inefficiencies and reducing corruption risks."*



**Ms. Anumita Roychowdhury**  
Executive Director, CSE

The discussion also underscored the need for financial and institutional support to accelerate EV adoption and incentivize scrappage. Panelists agreed that existing scrappage incentives must be strengthened to make the transition to cleaner alternatives economically viable for vehicle owners.

*"Scrappage incentives should be structured to encourage widespread adoption, particularly among commercial vehicle operators,"* noted Shri Amit Bhatt.

## The Road Ahead:

- The panel concluded with a consensus on the importance of multi-stakeholder collaboration to drive systemic reforms in vehicle emission norms and enforcement strategies.
- The integration of technology-driven enforcement mechanisms—such as AI-based monitoring and real-time emissions tracking—was highlighted as a game-changer for improving policy effectiveness.
- Shri Nautiyal emphasized that regulatory stability and long-term commitment are essential for sustained impact and predictable regulatory shifts enable industry stakeholders to align their investments with long-term policy goals."
- The session reinforced that a comprehensive approach—combining stringent policies, data-driven enforcement, and coordinated governance—is key to achieving long-term reductions in vehicular emissions.





# Closing Remarks and Next Steps

The event concluded with a strong call for action to integrate advanced monitoring technologies with existing regulatory frameworks.

## Key recommendations included:

01 —————

### Strengthening technology-driven enforcement

The use of ANPR cameras, Remote Sensing Devices (RSD), and AI-powered analytics for real-time detection of high-emission vehicles.

02 —————

### Phasing out old vehicles

Implementing scrappage incentives and enforcing mandatory retirement of old commercial fleets.

03 —————

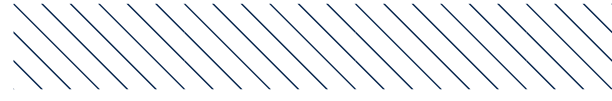
### Revamping the PUC system

Introducing automated, tamper-proof emission testing stations to enhance reliability and compliance.

04 —————

### Bridging the research-policy gap

Establishing platforms for continuous engagement between researchers, policymakers, and enforcement agencies to fast-track implementation.



The discussions reinforced that a comprehensive approach, involving robust regulations, advanced technology, and cross-sector collaboration, is crucial for mitigating vehicular emissions and improving air quality in India's urban centers. Moving forward, stakeholders must work together to drive systemic reforms and implement data-driven policy solutions.



## SPEAKER BIOS



### **Shri. Mahmood Ahmed**

Additional Secretary, Ministry of Road Transport and Highways (MoRTH)

Shri. Mahmood Ahmed is the Additional Secretary, MoRTH. He is a 1993 batch IP&TAFS Officer. Prior to this, he has held senior positions in both the Government of India and the Government of Odisha. With a career spanning over three decades, he has extensive experience across various ministries and departments.



### **Shri. Amit Bhatt**

Managing Director, International Council on Clean Transportation (ICCT India)

Shri. Amit Bhatt is the ICCT's Managing Director for India. He is based in New Delhi and has over 20 years of experience in transportation, urban development, and management. Before joining ICCT, Amit was Executive Director for Integrated Transport at World Resources Institute (WRI) India for 12 years.



### **Dr. Urmila Chatterjee**

Executive Director of DPIC and Research Director at the Energy Policy Institute at the University of Chicago (EPIC-India)

Dr. Urmila Chatterjee is the Urmila comes to the University of Chicago from a distinguished career at the World Bank where for more than a decade she delivered high-quality knowledge products, led policy dialogue, and implemented complex lending projects in South Asia.



### **Dr. Kaushik Deb**

Executive Director at the Energy Policy Institute at the University of Chicago (EPIC-India)

Dr. Kaushik Deb leads EPIC India as the Executive Director. As an applied economist with over 25 years of experience, he has a distinguished career as a strategic advisor to governments and corporates on policy, markets, equity, access, and technology developments. Prior to joining EPIC India, he directed the India Program at Columbia University's Center on Global Energy Policy.



### **Ms. Tanushree Ganguly**

Director at the Air Quality Life Index (AQLI)

Ms. Tanushree Ganguly is the Director at UChicago's AQLI. Tanushree's career efforts focus on strengthening data-driven air quality decision making, and unpacking challenges in implementing national-level policies at local levels. Prior to joining AQLI, Tanushree led the Clean Air Programme at the Council on Energy, Environment and Water



## **Shri. Tim Gould**

Chief Energy Economist at the International Energy Agency (IEA)

Shri. Tim Gould is the Chief Energy Economist at the International Energy Agency (IEA). In this role, he provides strategic advice on energy economics across a wide range of IEA activities and analysis. He also serves as the Head of the Office of the Chief Energy Economist, co-leading the World Energy Outlook, the IEA's flagship publication series.



## **Shri. Anirudh Narla**

Researcher at ICCT

Shri. Anirudh Narla is a Researcher at ICCT working on electric vehicles, heavy-duty vehicles, and emissions testing in India. He focuses on truck electrification pathways and real-world emissions analysis using remote sensing and Portable Emissions Measurement Systems (PEMS).



## **Shri. Arvind Nautiyal**

Member Secretary, Commission for Air Quality Management (CAQM)

Shri. Arvind Nautiyal (an officer of the Indian Railway Service of Mechanical Engineers) is a qualified Mechanical Engineer by training through the prestigious Special Class Railway Apprentice Scheme. He is also the Member Secretary, CAQM in the NCR and Adjoining Areas.



## **Ms. Anumita Roychowdhury**

Executive Director, Research and Advocacy, Centre for Science and Environment (CSE)

Ms. Anumita Roychowdhury is the Executive Director, Research and Advocacy, CSE. She is in charge of research and advocacy on Sustainable Urbanisation that encompasses clean air, sustainable mobility and sustainable habitat.



## **Dr. Virinder Sharma**

Member (Technical), Commission for Air Quality Management (CAQM)

Dr. Virinder Sharma is presently full-time Member (Technical) in the CAQM in NCR and Adjoining Areas. Dr Sharma is an International Development Specialist with more than 30 years of professional, technical and management experience.



## **Dr. Sachin Shinde, IAS**

Managing Director of the Delhi Transport Corporation

Dr. Sachin Shinde, IAS, is the Managing Director of the Delhi Transport Corporation and Special Commissioner at the Transport Department, Government of Delhi. A distinguished officer of the Indian Administrative Service, Dr. Shinde previously served in the Ministry of Earth Sciences.

# in Vehicular

th Jan



Scan to know more  
about EPIC-India

