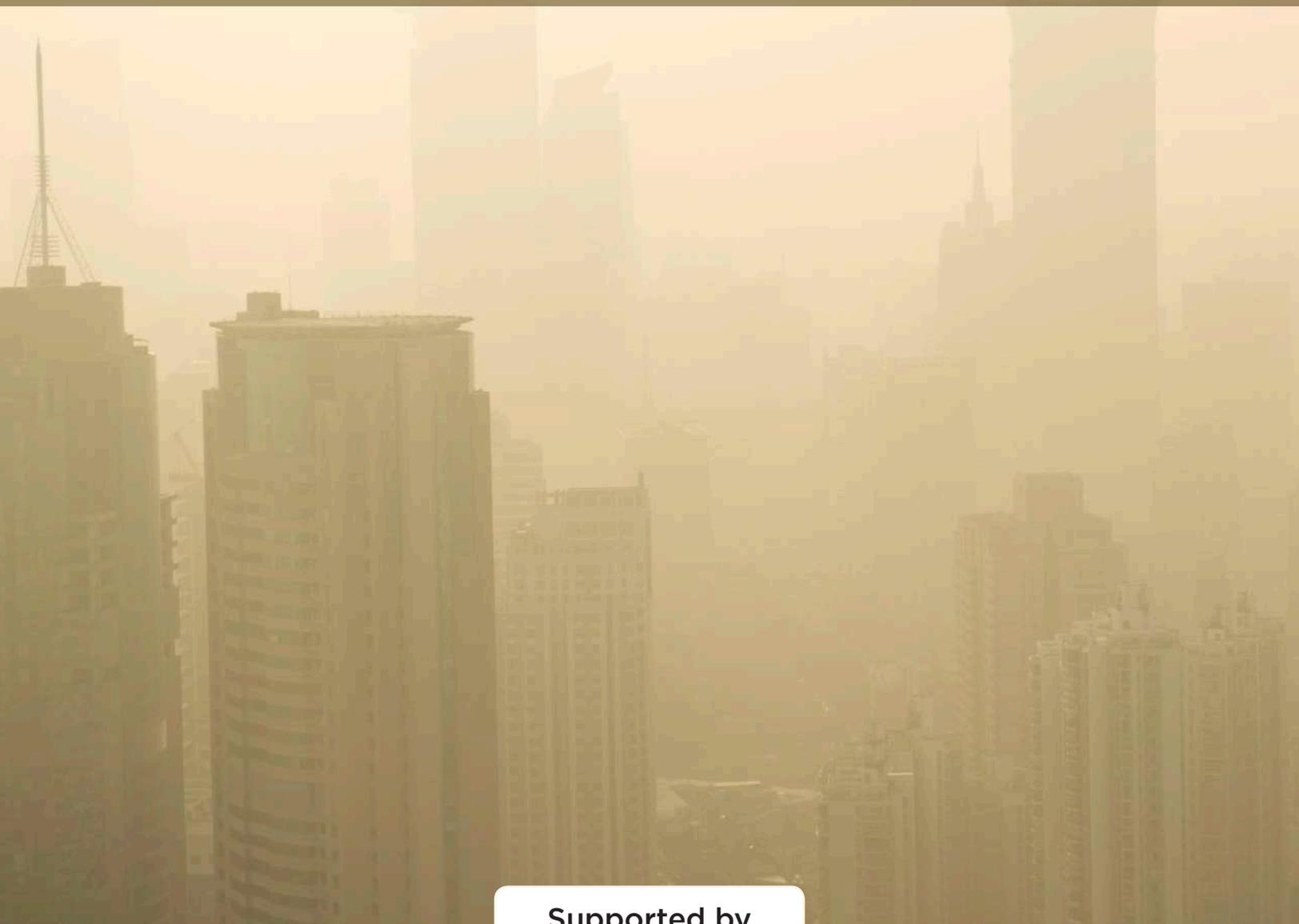


National Conference on INNOVATIONS IN POLLUTION REGULATION

*Discussing constraints and the reforms that can
improve compliance and reduce pollution*



Supported by



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EXECUTIVE SUMMARY

The National Conference on Innovations in Pollution Regulation, held on August 13, 2018, brought together pollution regulators, and academic experts to discuss challenges in pollution regulation in India, and initiatives taken by state regulators in strengthening monitoring and enforcement.

Justice AK Goel, the Chairperson of the National Green Tribunal, was the Chief Guest for the event, and Smt. Vandana Chavan, Member of Parliament, delivered a special address. The event was attended by representatives from six state pollution control boards who presented novel initiatives they have taken in recent years. These include the action framework to respond to continuous emissions monitoring data (Gujarat), a transparency initiative called the Star Rating program (Maharashtra and Odisha), financial instruments like bank guarantees and pollution charges (Odisha) and a dense network of air pollution monitors (Delhi).

The conference dealt with important questions for the future of environmental governance in India such as,

- Need for reforms in the environmental laws to provide regulators flexibility to respond to polluters,
- Improvements in monitoring of ambient air pollution, and emissions, and the use of these data for decision-making,
- Solutions to improve transparency of regulatory data and harness pressure from media and the public to improve environmental compliance,
- The potential for market based instruments to mitigate air pollution at lower costs,
- Urgent need to plug gaps in state capacity not only at pollution control boards, but even at the levels of the National Green Tribunal.

At the conference, researchers from Energy Policy Institute at the University of Chicago (EPIC) and Evidence for Policy Design (EPOD) at Harvard Kennedy School released a policy brief titled “A Roadmap Towards Cleaning India’s Air”, that captures findings in a recently published paper in the India Policy Forum. The recommendations included: Improving emissions monitoring by better aligning incentives of auditors, providing regulators with real-time data on polluters’ emissions, applying monetary charges for excess emissions, providing the public with information about polluters, and using markets to reduce abatement costs and pollution.



The Conference was organized by EPIC India and the The Tata Centre for Development at UChicago (TCD), in partnership with USAID and The Abdul Latif Jameel Poverty Action Lab (J-PAL).

Introductory Session

Dr. Kenneth Lee, Executive Director EPIC India welcomed the chief guest Justice A.K. Goel, the many representatives of the central and state governments, and all the guests to the National Conference on “Innovations in Pollution Regulation”. Introducing EPIC India as an environmental and energy-access research group that works hand in hand with government and industry partners, he mentioned about their ongoing partnerships with the Niti Aayog and the state governments of Maharashtra, Odisha, Bihar, Karnataka, Gujarat and Rajasthan.

Opening remarks by Prof. Michael Greenstone, Milton Friedman Professor of Economics at the University of Chicago highlighted the importance of environment regulations and the complexities of ensuring compliance. He discussed how pollution, now largely concentrated in parts of India, China and Africa, not only increases respiratory and heart disease, strokes, lung cancer but also impacts life expectancy. The air quality life index (AQLI), developed by researchers at EPIC, estimated that people in India will live longer by four years if India’s air quality met WHO standards. Delhi would gain nine years of lifespan if the air quality meets WHO standards. He stated “environmental regulations are complicated and difficult to enforce but there are real benefits. India has a strong history of environmental democracy but the truth is, throughout the world, implementing regulations is challenging”. Environment regulation is important and so is robust economic growth. A move from command and control, i.e. regulatory authorities enforcing compliance, to market based regulations could be a win win solution to achieve both.

“State Pollution Control Boards have been charged with responsibility but they lack in practicality.”

Justice Adarsh Kumar Goel,
Chairman, National Green Tribunal



Dr. Ken Lee, Executive Director, EPIC India delivering the welcome address at the National Conference on Innovations in Pollution Regulation in New Delhi.

The opening remarks were followed by a special address from Smt. Vandana Chavan, Member of Parliament, Government of India. She spoke about the number of cities that have severe levels of air pollution in India, the challenges that they face and that no one solution fits all.

She started by quoting a World Health Organization (WHO) study which states that “9/10 of most polluted cities in the world are in India.” She continued to list the different reasons for air pollution in India and said that “A multi-sectoral approach still remains one of the biggest challenges for India.”

Lastly, she spoke about the Maharashtra Star Rating Program, launched by Maharashtra Pollution Control Board (MPCB) and researchers from the Energy Policy Institute at the University of Chicago’s India team (EPIC India), Evidence for Policy Design (EPoD) at Harvard Kennedy School, and Abdul Latif Jameel PoGverty Action Lab (J-PAL). This

program aims to increase transparency and public accountability by rating industries in Maharashtra based on their air pollution levels. These ratings are publicly available at www.mpcp.info.

Chief Guest Hon'ble Justice Mr. AK Goel, Chairman, National Green Tribunal (NGT) discussed the issues of implementing regulations and the challenges that Central Pollution Control Board (CPCB) faces to enforce compliance. However, currently the NGT being only a 6 member team with 2 expert members, cannot have more than 2 benches at any time. Due to lack of expert members, NGT in other states were closed. The current team has now opened all four branches of NGT - in Chennai, Pune, Bhopal and Kolkata. In future, to work around capacity constraints in remote areas, there are plans to provide online access to courts. He further discussed the issues of lack of expertise at the level of municipality, for example the understanding that waste dumping is not waste disposal, assessing compensation from polluters, relief and rehabilitation challenges and the importance of data sharing and transparency.

These introductions were followed by a panel discussion, moderated by Prof. Michael Greenstone and Prof. Rohini Pande, Rafik Hariri Professor of International Political Economy at Harvard Kennedy School.



(From Left) Prof. Rohini Pande, Hon'ble Justice Mr. Adarsh Kumar Goel, Smt. Vandana Chavan and Michael Greenstone discussing innovations in pollution regulation in India.

“The confluence of technology, big data and right incentives is opening the door for high regulation activities.”

Prof. Michael Greenstone,
Milton Friedman Professor in Economics and Director of the Tata Centre for Development and Energy Policy Institute at the University of Chicago

The panel discussion covered topics of state and municipal capacity for implementation and monitoring air pollution, role of the judiciary, pollution charges and incentives for industries and citizens to actively engage in dialogue on air pollution and implement solutions to mitigate air pollution.

Talking about capacity constraints, Justice A.K. Goel agreed that there is low regulatory staff in India and lack of credibility and skills among people on the ground. Pollution boards are also politically manned and there is a serious conflict of interest issue.

In terms of incentives, Smt. Vandana Chavan said that in Pune, if residents take up renewable sources of energy or segregation of solid waste or rain water harvesting, there is a rebate of five percent offered on property tax. Even with these individual initiatives and incentives, the question remains that “What will it take for India to declare war on air pollution?”

At the end of the session, the audience had questions about the quality of air pollution monitoring in Pune and if states can have a fund for inter-state pollution issues. Responding to the question about inter-state pollution issues, Justice A.K. Goel said that it is possible and has been done successfully in the case of water pollution. Sutlej river which flows through Rajasthan and Punjab was heavily polluted. Water pollution in the river is now being monitored using sensors and action is being taken to clean the river. State pollution control boards of Rajasthan and Punjab along with CPCB were instrumental in dealing with this issue. ■

SESSION 1:

Evidence-Based Decisions: Information Quality and Transparency

The opening remarks were given by Prof. Rohini Pande. She talked about the challenge of policy implementation and the importance of effective communication within the government, from the top-level officials to the district managers. There is a need to improve the quality of information flow and the implementation based on data. And this data needs to be translated into action.

To get implementation done, there is a need to build capacity and technology and set the right incentives to prevent conflict of interest.

The opening remarks were followed by a panel discussion. The panel consisted of Mr. Sanjay Shukla, Secretary Housing and Environment, Government of Chhattisgarh and Member Secretary, CECB; Professor Joshua Apte, Assistant Professor, University of Texas and Dr. Priya Sreedharan, Senior Clean Energy Technical Advisor with USAID. The session was moderated by Prof. Rohini Pande.

Mr. Sanjay Shukla shared various policy measures that the state government in Chhattisgarh and local departments undertook to tackle the problem of

“It’s exciting to see the advances made in terms of pollution monitoring and a lot of it is driven by low cost sensors, enhanced computing capacities and communication infrastructure.”

Dr. Priya Sreedharan,

*Senior Technical Advisor,
United States Agency for International
Development India*



Prof. Rohini Pande setting the tone of discussions for the first session of the day.

air pollution in the city of Raipur. He highlighted how departments like urban planning, transport etc. recognised the problem as an emergency and came together to plan, devise and implement monitoring and curbing measures. They devised their own standard operating procedures (SOP) to tackle industrial pollution due to lack of action plans from CPCB.

Recognizing the complexity of targeting various sources of air pollution, Joshua Apte emphasised the need for continuous and mobile monitoring of pollution and elaborated an example of how they have set-up a lab at IIT Delhi that generates and analysis minute by minute air pollution from various sources in Delhi. He stated that “Data can help improve efficacy of policy targeted at source.”



(From Left) Prof. Rohini Pande, Dr. Priya Sreedharan, Mr. Sanjay Shukla and Prof. Joshua Apte discussing the importance of information quality and transparency to drive effective regulations.

Answering a question on how industrial emissions monitoring has evolved in the US and approaches relevant for the Indian context, Dr. Priya Sreedharan responded that there needs to be focus on enforcement based on data. Initiatives take time and technology such as low cost sensors and communications infrastructure have brought down the cost for these initiatives.

In terms of policy design, there is a need to move to a distributed model and not stationary stack Continuous Emissions Monitoring System (CEMS) model.

The audience questions for this session were on the sources of revenues for pollution control boards, why clean energy can't be used by industries and the importance of cost effectiveness of implementation activities. ■

SESSION 2:

Pollution Regulation: Effective and Efficient Enforcement

The session began with opening remarks from Prof. Michael Greenstone. He highlighted the lack of reliable information available to the regulator for decision making and the importance of transparency. Information on industrial air pollution has been made available on the Maharashtra Pollution Control Board (MPCB) website, under the Maharashtra Star Rating Program. This effort is being taken forward by making a website for industrial pollution ratings based on CEMS data, in Odisha publicly available.

The opening remarks were followed by a panel discussion. The panel consisted of Prof. Shreekanth Gupta, Delhi School of Economics; Mr. Nitin Sethi, Senior Associate Editor, Business Standard and Mr. Gaurav Joshi, Senior Environmental Specialist, World Bank. The session was moderated by Prof. Michael Greenstone.



Prof. Michael Greenstone talks about the need of effective and efficient enforcement for pollution regulations.

Answering the question on feasibility of replicating the success of China in India, Mr. Nitin Sethi pointed to the difference in public perception and central political debate around air pollution between the two countries. He said that historically in China, there has been more emphasis on relating pollution to public health outcomes which still lacks in India. On the use of market instruments for pollution regulation, he stated how market mechanisms are being used in other areas but not pollution and that India has a justice based mechanism for environmental regulation in general.

On the question about market instruments, “Is India ready for market based interventions/instruments?”, Prof. Shreekanth Gupta stated that India is ready for the shift from more regulatory mechanism

“Data is essential but it should not become the means and ends, both.”

Nitin Sethi,
*Senior Associate Editor,
Business Standard*

towards market based instruments. There have been discussions in government committees since 1990s and ready made lessons are now available and time has come where the country should take this step.

Mr. Gaurav Joshi spoke about how legislation from 70s governs environmental regulation today and the need for governance to improve and respond to and use data. Talking about his experience with state pollution control boards, he said that in the 90s manual sampling for industrial pollution monitoring was a common practice. This is not great and should not continue.

The session concluded with an audience question about the willingness to install CEMS by industries and monitoring industrial pollution. Chirag Bhimani, Deputy Environment Engineer, Gujarat Pollution Control Board (GPCB), said that in his experience in Gujarat, some industries are willing to install CEMS, while others are not. Well calibrated instruments lead to good data which in turn leads to improved monitoring of industries by regulators. To move away from manual sampling and to move towards CEMS, strong legal backing is needed. Ideally, they would want to move from concentration-based sampling to load-based sampling. ■



(From left) Prof. Michael Greenstone, Nitin Sethi, Prof. Shreekanth Gupta and Gaurav Joshi at a panel discussion at the National Conference on Innovations in Pollution Regulation.

SESSION 3:

Recent Strides taken by States

Post lunch was a knowledge sharing session with the state pollution control boards about their key initiatives. The session was moderated by Dr. Santosh Harish, Associate Director of Research, EPIC India.

Dr. V.M Motghare, Joint Director Air, Maharashtra Pollution Control Board (MPCB) discussed the Star Rating Program developed in consultation with researchers from EPIC India, EPoD and J-PAL. It's a first of its kind program in India, rating industries based on how polluting they are through public disclosure. They currently have 311 industries from 10 sectors, including cement, pharma, chemical, sugar, textile, power etc. as part of this program. Ratings are based on median particulate matter (PM) concentration of four most recent samples collected by MPCB field officials. Apart from this data being made available publicly, report cards based on them are shared with the industry representatives at the regional workshops. MPCB also issues directives to industries with 1 or 2 stars. The MPCB officials have collected 20,000 samples over the last three years and during the operation only the logistics and instruments were outsourced. They plan to extend the program to 900 industries. They have also installed 25 continuous Emissions Monitoring Systems (CEMS).

Pollution charges is not a penalty or a fine. It is an economic instrument that industries have to pay for being non-compliant.”

Dr. Akhila Kumar Swar,
*Chief Environment Engineer,
Odisha State Pollution Control Board*



Dr. V.M Motghare, Joint Director Air, Maharashtra Pollution Control Board presenting his work at the conference.

Dr. A. K. Swar, Chief Environmental Engineer, Odisha State Pollution Control Board (OSPCB) discussed how he has never seen a report from industry where data shows anyone polluting above norms. He talked in detail about their bank guarantee initiative, which makes it difficult for industry to get further loans in case they are non-compliant. The bank guarantee does not involve transfer of any money or deposits, it is simply a paper from bank which is required during clearance of loan. Odisha is a state rich in minerals and mines and there are many industries in Odisha like steel, cement etc.

Keen to replicate the Maharashtra's star rating program, Odisha in partnership with EPIC India will launch its own rating program soon. The Odisha star rating program is more dynamic as it is based on real time data from CEMS. There will not be any manual testing and uploading of data. During the process of building the rating program, they undertook many capacity building exercises for the field officers as they were not aware of online monitoring. They are more comfortable with offline

monitoring systems. To further improve the system, there is a need to strengthen the IT infrastructure.

Dr. Santosh Harish asked Chirag Bhimani, Deputy Environment Engineer, GPCB to share Gujarat's experience of CEMS data utilization. Bhimani explained the reasons for implementing the Emission Trading Scheme (ETS) using CEMS data and choosing Surat as an ideal project location. He said that they chose ETS over other schemes, since it was targeting Particulate Matter (PM), which was the primary concerning pollutant for the GPCB and Surat met the required pre-conditions for the implementation in terms of number, homogeneity and market structure. He also explained the current framework of action-based regulation for industries and stated that it has resulted in stabilization of PM levels and data availability has also increased overtime.

Dr. Mohan George from the Delhi Pollution Control Committee (DPCC) shared the historical timeline

for air pollution monitoring in Delhi. He said that ambient air monitoring was started by the CPCB in 1982 and since then, with the advent of technology, real time monitoring of concentrations has been made possible. Delhi currently had a network of 42 stations shared between DPCC, CPCB and IMD. He highlighted the availability of real-time data on pollution as one of the effective policy enabler and stated how the Delhi government is using this data to issue public warnings and also implement the Graded Response Action Plan (GRAP)

The session concluded with answer by Dr. Swar to the audience question on the enforcement process for non-compliant industries. He explained how the steps for action varied based on the prioritization of industries in terms of pollution, generally as initial steps they would take bank guarantees, then issue show-cause notices and finally have personal hearings. According to him, there were hardly any cases that reached the court. ■



(From Left) Dr. Santosh Harish, Dr. Akhila Kumar Swar, Dr. V.M Motghare, Dr. Mohan George and Mr. Chirag Bhimani discussing the steps taken by different state pollution control boards to cut pollution.

Closing Remarks

Dr. Anant Sudarshan, South Asia Director, EPIC summed up the day by thanking all the participants and attendees. He said that “Right of Life underpins environment regulation and policy” and highlighted how this is followed by recent academic work trying to link changes in life expectancy and pollution. He reminded the participants of the role that data or information can play in building local capacity in terms of incentivizing the stakeholders. He concluded by recognising air pollution as a multi-sectoral challenge and highlighting effective communication between stakeholders like governments, industries and academics being a key enabler to address the challenge. ■

“Without good information, the state cannot manage, regulate or even monitor.”

Dr. Anant Sudarshan,
South Asia Director, EPIC



Dr. Anant Sudarshan synthesizing the key takeaways from the conference.

Annexure 1 - Agenda

National Conference on <i>Innovations in Pollution Regulation</i>		
UChicago Center in Delhi		August 13, 2018
0930-1000	REGISTRATION	
INTRODUCTORY SESSION: INNOVATIONS IN POLLUTION REGULATION		
1000-1005	Welcome address	Dr. Ken Lee, Executive Director, EPIC India
1005-1015	Opening remarks	Prof. Michael Greenstone, Milton Friedman Professor of Economics at the University of Chicago
1015-1025	Special address	Smt. Vandana Chavan, Member of Parliament, GoI
1025-1040	Chief Guest's remarks	Hon'ble Justice Mr. Adarsh Kumar Goel, Chairman, National Green Tribunal (NGT)
1040-1115	Discussion and Q&A	Moderated by Prof. Rohini Pande, Rafik Hariri Professor of International Political Economy at Harvard Kennedy School
SESSION 1: EVIDENCE-BASED DECISIONS: INFORMATION QUALITY AND INFORMATION TRANSPARENCY		
1115-1125	Introduction	Prof. Rohini Pande (Moderator)
1125-1215	Panel Discussion and Q&A	Mr. Sanjay Shukla, Secretary Housing and Environment, GoChattisgarh, and Member Secretary, CECB Prof. Joshua Apte, Assistant Professor, University of Texas Dr. Priya Sreedharan, USAID
1215-1230	Break	
SESSION 2: POLLUTION REGULATION: EFFECTIVE AND EFFICIENT ENFORCEMENT		
1230-1240	Introduction	Prof. Michael Greenstone (Moderator)
1240-1330	Panel Discussion and Q&A	Prof. Shreekanth Gupta, Delhi School of Economics Mr. Nitin Sethi, Senior Associate Editor, Business Standard Mr Gaurav Joshi, Senior Environmental Specialist, World Bank
1330-1415	Lunch	
1415-1420	Introduction to TCD	Dr. Leni Chaudhuri, Country Director, Tata Centre for Development at UChicago (TCD)
SESSION 3: RECENT STRIDES TAKEN BY STATES		
1420-1510	SPCB presentations	Dr. V.M Motghare, Joint Director Air, MPCB Dr. Akhila Kumar Swar, Chief Environmental Engineer, OSPCB Mr. Chirag Bhimani, Deputy Environment Engineer, GPCB Dr. Mohan George, Sr. Scientist, DPCC
1510-1530	Q&A	Moderated by Dr. Santosh Harish, Associate Director, Research, EPIC India
1530-1540	Closing remarks	Dr. Anant Sudarshan, South Asia Director, EPIC
1540 Onwards	Tea	

Speaker Biographies

Hon'ble Justice Adarsh Kumar Goel

Chairman, National Green Tribunal (NGT)

Adarsh Kumar Goel is a former judge of the Supreme Court of India. He is a former Chief Justice of the Odisha High Court and the Guwahati High Court, and a former justice of the Punjab and Haryana High Court. He is currently serving as the chairperson of National Green Tribunal.

Smt. Vandana Chavan

Member of Parliament, Government of India

Vandana Chavan is a member of Rajya Sabha from Maharashtra and member of several committees of Rajya Sabha including Committee on Empowerment of Women, MPLADS, Science, Technology, Environment and Forests and General Purpose Committee. She has participated in several climate change deliberations at national and international platforms including COP 21. Mrs. Chavan has taken leading role in several environmental movements in the city of Pune. She is also the funding President of ALERT-a network initiative to bring about dialogue between Government, elected representatives and citizens on climate change.

Prof. Michael Greenstone

Milton Friedman Professor in Economics and Director of the Tata Centre For Development and Energy Policy Institute at University of Chicago

Michael Greenstone has previously served as the Chief Economist for President Obama's Council of Economic Advisers, where he co-led the development of the United States Government's social cost of carbon. Greenstone also directed The Hamilton Project, which studies policies to promote economic growth, and has since joined its Advisory Council. He is an elected member of the American Academy of Arts and Sciences, a fellow of the Econometric Society, and a former editor of the Journal of Political Economy. Before coming to the University of Chicago, Greenstone was the 3M Professor of Environmental Economics at MIT.

Dr. Ken Lee

Executive Director- India, EPIC India

Ken Lee is the Executive Director of EPIC India. He is also a Senior Research Associate at the Department of Economics, University of Chicago. Previously, Ken was a post-doctoral research fellow at the Center for Effective Global Action (CEGA) and the Energy Institute at Haas. He holds a PhD from the University of California, Berkeley and an MIA from the School of International and Public Affairs (SIPA) at Columbia University. Ken works on topics related to development economics and energy economics.

SESSION 1

Prof. Rohini Pande

Rafik Hariri Professor of International Political Economy at Harvard Kennedy School

Rohini Pande is an economist whose research examines the economic costs and benefits of informal and formal institutions in the developing world and the role of public policy in affecting change. Pande is the Rafik Hariri

Professor of International Political Economy at Harvard Kennedy School. She co-directs the Evidence for Policy Design (EPoD) Initiative (@EPoDHarvard). Her work has examined how institutions - ranging from electoral to financial - can be designed to empower historically disadvantaged groups; how low-cost improvements in information collection and dissemination can enable flexible regulation and more efficient outcomes in areas as diverse as environmental protection and elections; and how biased social norms, unless challenged by public policy, can worsen individual well-being and reduce economic efficiency.

Mr. Sanjay Shukla

Secretary Housing and Environment, Government of Chattisgarh, and Member Secretary, CECB

Sanjay Shukla is the Secretary, Department of Housing, Environment, Electronics and Information Technology in the Government of Chattisgarh, and Member Secretary of Chhattisgarh Environment Conservation Board. Sanjay Shukla is an officer of the Indian Forest Service belonging to the Batch of 1987, and has a long and distinguished career where he has been given many responsibilities. These include being the Director of Kanha National Park, the Commissioner of Urban Administration and Development, and CEO of State Urban Development Agency, Chhattisgarh for 3 years, and CEO of the Capital Area Development Agency. His work with the Chhattisgarh Housing Board has been recognized by GOI and HUDCO for excellence in low-end housing in the country. He was also awarded the PM's recognition for Bhagirathi NalJal Yojana, a tap-water supply scheme for slum-dwellers.

Prof. Joshua Apte

Assistant Professor, University of Texas

Prof. Joshua Apte is an assistant professor in the Department of Civil, Architectural, and Environmental Engineering at the University of Texas. Prior to joining UT-Austin, he was the ITRI-Rosenfeld Postdoctoral Fellow at Lawrence Berkeley National Laboratory. His core training is in air quality engineering and in techniques for air pollution exposure assessment: understanding the sources, physicochemical transformations, and spatial patterns of the pollution that people breathe, and methods for reducing these exposures. He has a strong regional interest in Asia and elsewhere in the developing world.

Dr. Priya Sreedharan

Senior Clean Energy Technical Advisor, USAID India

Dr. Sreedharan is the senior clean energy technical advisor with USAID India where she provides technical and strategic input on USAID's energy and air quality activities. She has a dual environmental and mechanical engineering background and 20 years of experience across air quality management, power sector and utility reform. Prior affiliations include the USEPA, Lawrence Berkeley Laboratory, and Civic Consumer Action Group in Chennai. She has a PhD and MS in mechanical engineering from the University of California, Berkeley where she developed data analytics for air quality and energy efficiency applications.

Session 2

Prof. Shreekant Gupta

Associate Professor, Delhi School of Economics, University of Delhi

Prof. Gupta has worked as a policymaker and researcher in areas of environmental economics and policy, urban policy and public policy over the last 30 years. His teaching and research interests are in applied microeconomics and econometrics in these contexts. He has served on several national and international committees including the Task Force to Evaluate Market Based Instruments for Pollution Abatement, Ministry of Env., Forests and Climate Change, Gol, and the Intergovernmental Panel on Climate Change.

Mr. Nitin Sethi

Senior Associate Editor, Business Standard

Nitin is one of the most well-known environment journalists in the country and writes on governance and political economy and has kept a particularly deep focus on development, natural resources, energy and environment.

Mr. Gaurav Joshi

Senior Environmental Specialist, World Bank

Gaurav D Joshi's training is in Civil and Environmental Engineering from India and the UK, and has over 20 years of experience of working with a number of stakeholders in the environmental field - NGO, Consultants, Government, and funding agency - his current employers. Before joining the World Bank over a decade ago, Gaurav worked as a consultant in a private firm, and consulted with WB, WWF, etc. In a previous avatar, he was a foot soldier of a government regulatory entity in western India. His interests in Environmental field span pollution control, institutional architecture, and ethics.

Dr. Anna Agarwal

Associate Director - Urban Innovation, Energy and Environment Lab and Senior Fellow (EPIC India)

Dr. Agarwal, who has a PhD from MIT, has held research appointments at the MIT Center for Energy and Environmental Policy Research, assessing risks in the carbon capture and storage value chain; and the MIT Energy Initiative, co-authoring the MIT study "Natural Gas Monetization Pathways for Cyprus." She has worked at The Brattle Group, a U.S. economics consulting firm, where her work focused on regulatory policy and ratemaking matters in the U.S. electric power industry. Dr. Agarwal has also worked at the Government of India's Energy and Power Division in the Planning Commission.

Dr. Santosh Harish

Associate Director - Research, EPIC India

Santosh Harish is Associate Director - Research of the India center of the Energy Policy Institute at the University of Chicago. Previously, he was a Post-Doctoral Fellow with Evidence for Policy Design (EPoD) India and J-PAL South Asia, and a Sustainability Science Fellow at the Harvard Kennedy School. He received his PhD in Engineering and Public Policy from Carnegie Mellon University, and his undergraduate degree in Metallurgical and Materials Engineering from the Indian Institute of Technology Madras. Santosh's research interests lie in energy and environment policy, with ongoing work in electricity distribution reforms and air pollution monitoring in India.

Dr. Leni Chaudhuri

Country Director, The Tata Centre for Development at UChicago

Chaudhuri has worked extensively with program strategy and academic grant management. Prior to joining the TCD, she was the Vice President of the Narotam Sakhsaria Foundation where she worked for more than 9 years translating the vision and mission of the foundation into impactful programs in health, education, livelihoods, governance, and civic issues. She brings many years of experience building strategic networks with academic institutions, governments, and philanthropic organizations.

Dr. VM Motghare

Joint Director of Air Pollution Control, State Pollution Control Board, Maharashtra

VM Motghare is the Joint Director of Air Pollution Control at the Maharashtra Pollution Control Board. He has a MTech and PhD in Environmental Engineering and a Post Graduate Diploma in Management and Law. He has held various positions at the MPCB since 1993.

Dr. Akhila Kumar Swar

Senior Environmental Engineer, State Pollution Control Board, Odisha

Dr. Akhila Kumar Swar has been working in the State Pollution Control Board, Odisha, since February 1991. He has been heading consent to operate of highly polluting industries, online monitoring and hazardous waste management cell of SPCB, Odisha. He has wide experience in implementations of pollution control technologies in industries and utilization of hazardous waste. He has introduced Y-cable concept since 2011 which first of its kind in India for tamper proof real time data transmission through GPRS link from online ambient air, stacks and effluent quality monitoring stations installed in industries of Odisha.

Mr. Chirag Bhimani

Deputy Environmental Engineer, State Pollution Control Board, Gujarat

Chirag Bhimani joined Gujarat Pollution Control Board (GPCB) in 1996 as an Assistant Environmental Engineer and was promoted to Deputy Environmental Engineer in 2002 and is currently working as Deputy Environmental Engineer at GPCB Head Office in Gandhinagar. He was the Head of Information Technology Division and now looks after Bhavnagar, Junagadh Palanpur and Porbandar Area as a Unit Head and coordinator - convener for Continuous Online Monitoring System (CMS) and for Preparation of Best Available Techniques Reference (BREF) Document at GPCB. His current assignment at GPCB is to advise and implement strategies for the management of environmental issues impacting land, air, water and people including air pollution, water pollution, noise pollution and wastes.

Dr. Mohan P. George

Sr. Scientist, Delhi Pollution Control Committee

Mohan P. George is working as a scientist in charge of air in the Laboratory of Delhi Pollution Control Committee. He developed and commissioned a real-time ambient air monitoring network in Delhi for the DPCC and is actively involved in the monitoring of ambient air quality and air pollution status. Previously, he worked as a member of the State Level Environmental Appraisal Committee (SEAC), and before that worked in different committees as a member formed on Supreme Court/ High Court orders for evaluation and assessment of abatement steps taken by different industries.

Dr. Anant Sudarshan

Executive Director-South Asia, Energy Policy Institute at University of Chicago

Anant works at the intersection of environmental economics and engineering, with on-going research on a variety of areas including environmental regulation, air-pollution, climate change, energy efficiency, electricity and renewable energy. His present work includes collaboration with India's Ministry for Environment and Forests to design and evaluate a pilot emissions trading program to regulate industrial air pollution. He is also working with the Government of Bihar on electricity distribution reforms designed to reduce losses and enhance the supply of power.

The Energy Policy Institute at the University of Chicago, India (EPIC India) is confronting the global energy challenge by working to ensure that energy markets provide access to reliable, affordable energy, while limiting environmental and social damages. We do this using a unique interdisciplinary approach that translates robust, data-driven research into real-world impacts through strategic outreach and training for the next generation of global energy leaders. A hub of our efforts centers in India, where we maintain a robust research portfolio and deep network of collaborations. EPIC India is based at the University of Chicago Center in Delhi.