INTEGRATED ASSESSMENT OF AIR POLLUTION AND GREENHOUSE GAS MITIGATION IN INDIA

5 Days online Training Workshop
September 13-17, 2021

PARTICIPANTS FEES: RS.15,000/-

BACKGROUND

Severity of air pollution has risen multi-fold due to increasing energy demand, infrastructural development and growing economic activity. Liveability index of Indian cities have declined drastically due to increase in air pollution as well as some of the world's worst air quality levels experienced by many cities in recent years. The WHO Global Ambient Air Quality Database (2018) shows that New Delhi is having the sixth highest annual mean concentration of fine particulate matter among cities around the world. In India, premature death and disease caused by air pollution has become major concern and is the largest environmental health threat. According to the latest Lancet study, in 2019, 1·67 million deaths were attributable to air pollution in India, accounting for 17·8% of the total deaths in the country. The majority of these deaths were from ambient particulate matter pollution and household air pollution. Besides endangering health and shortening lifespan, air pollution adversely affects economic productivity.

The Indo-Gangetic Plain (IGP) is one of the significant hotspot region of air pollution in India and Indian subcontinent. High PM2.5 concentrations are forming a heavy pollution cloud from the border to Pakistan through the six states of Punjab, Haryana, Uttar Pradesh, Delhi, Bihar, West Bengal and one union territory (UT) of Chandigarh to the border of Bangladesh. It occupies 60% of India's total area and hosts about 40% of the total Indian population. Rapid economic growth and poorly regulated developmental activities have further deteriorated the air quality in this region. Additionally, the stagnant winds, frequent temperature inversions, high relative humidity, and low boundary-layer height over IGP favors the accumulation of aerosols/pollutants and the formation of secondary aerosols, i.e., water-soluble organic carbon, sulfates, ammonium, and nitrates.

TIFAC

BACKGROUND PAPER

INDIA-IIASA PROGRAMME

The high burden of air pollution in India and its substantial adverse impact on output could impede India's overall economic development and social wellbeing unless they are addressed as a priority. The variations in these impacts between states indicate that investments in state-specific air pollution control strategies are needed to reduce the significant adverse health and economic impact of air pollution across India. The Sustainable Development Goals (SDGs) also call for reduction of the burden of deaths and diseases from air pollution. An integrated assessment approach to mitigate the air pollution at city level is need of the hour to understand the cost implication and co-benefits in terms of associated GHGs emission reductions.

ABOUT THE WORKSHOP-INTEGRATED ASSESSMENT OF AIR POLLUTION AND GAINS MODEL

Many of the traditional air pollutants and green- house gases have common sources. These emissions interact in the atmosphere and, separately or jointly, cause a variety of environmental effects at the local, regional and global scales. A wealth of literature has pointed out that capturing synergies and avoiding trade-offs when addressing the two problems simultaneously through a single set of technologies or policy measures offers potentially large cost reductions and additional benefits. Recently, several integrated assessment frameworks have been developed that allow systematic analyses of co-benefits for different countries or world regions based on a harmonized methodology. In addition, such integrated models also facilitate a targeted analysis of strategies that maximize co-benefits between air pollution control and greenhouse gas mitigation.

The Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model developed by the International Institute for Applied Systems Analysis (IIASA) explores cost-effective emission control strategies that simultaneously tackle local air quality and greenhouse gases so as to maximize benefits at all scales. GAINS provides an authoritative framework for assessing strategies that reduce emissions of multiple air pollutants and greenhouse gases at least costs, and minimize their negative effects on human health, ecosystems and climate change. The GAINS model simulates the flow of pollutants from their sources to their multiple effects and estimates costs and impacts of policy interventions. The GAINS IGP version focuses in particular on the GAINS - regions of Uttar Pradesh, Punjab (including Chandigarh), Haryana, Delhi, Bihar, West Bengal.

The GAINS model produces emission scenarios for all major air pollutants for any exogenously supplied projection of future economic activities, it estimates abatement potentials and costs and takes full account of the interactions in abatement between various pollutants. Essentially, the GAINS model follows pollutants from their driving forces (i.e., economic activities such as energy consumption, agricultural production, industrial activities, etc.), it considers region- and source-specific emission characteristics, it analyzes the potentials for reducing emissions through a variety of technical and non-technical measures and estimates the associated costs, it simulates the fate and dispersion of emissions in the atmosphere and it computes impact indicators for human health, ecosystems, and greenhouse gas emissions.

NEED FOR WORKSHOP

India is an emerging economy with a burgeoning population that has accelerated its industrial activities in the last three decades, leading to widespread air pollution and resulting adverse health effects. Six of the world's 10 cities with the worst air pollution are in India, according to data compiled in IQAir AirVisual's 2019 World Air Quality Report. The Indo-Gangetic Plain (IGP) experiences high levels of air pollution during the post-monsoon season due to stagnant meteorological conditions and higher air pollution emissions. Recent advances in the field of air pollution research, specifically in the Indo-Gangetic Plain (IGP), highlight the fact that the problem extends beyond local concerns to transboundary issues. With pollutants reaching alarming levels, there are far-reaching and hazardous consequences on environmental and human health. Although air pollution has caught the attention of the public and policymakers, a considerable gap still exists in the general understanding regarding the health impacts of air pollution in the IGP region, considering the wide range of air pollution sources, pollution transport, exposure patterns, and the region's complex geography.

Many traditional air pollutants and greenhouse gases have common sources. Their emissions interact in the atmosphere, and—jointly and individually—cause a variety of harmful environmental effects at the local, regional, and global scales. The GAINS model explores cost-effective emission control strategies that simultaneously tackle local air quality and greenhouse gases so as to maximize benefits at all scales. This GAINS tool offers three ways to reveal policy interventions with multiple benefits:

- ·Simulation of the costs, health and ecosystems benefits of user-defined packages of emission control measures;
- Cost-effectiveness analysis to identify least-cost packages of measures that achieve user-defined policy targets; and
- Cost-benefit assessments that maximize (monetized) net benefits of policy interventions.

There are important interactions between climate and air quality strategies, and development, economic and social policy objectives. However, maximizing the potential co-benefits from these - well-documented - interactions poses a host of complex challenges to decision makers. The GAINS model supports decision makers in devising smart solutions that deliver tangible benefits to diverse groups in society through innovative methodologies that bring together relevant insights from recent research on geo-physical, economic and social aspects of pollution control. In particular, GAINS pioneers strategic research into a wide range of links between local air pollution and other policy objectives.

Accordingly, it is necessary to facilitate a platform for collaboration and sharing among relevant stakeholders and researchers in different aspects of air pollution and public health, primarily in IGP States/UT's and broadly in the entire country. A virtual workshop on air pollution in India is therefore being organized by the Technology Information Forecasting and Assessment Council (TIFAC), International Institute for Applied Systems Analysis (IIASA), and the National Environmental Engineering Research Institute (NEERI) from Semtember 13-17, 2021. The workshop will bring together atmospheric scientists, researchers and policy makers from across the region to discuss and communicate the current scientific consensus on air quality and the health impacts of air pollution.

The workshop would provide a deeper understanding on the following issues through application of GAINS model:

- How to manage sustainable development /clean air without compromising economic development
- Identifying actions that achieves maximum environmental benefits at least costs through an integrated approach
- The solution of complex problems, like combating the effects of air pollution, implies the investigation of all the concerned aspects, looking at links, synergies and trade-offs, pursuing the most effective actions to simultaneously address the causes behind.

- To address the issues of air pollution at local/regional/national level, identifying science research issues, need of technology developments, impact on the environment and human health, macro-economic aspects, social implications,etc.
- Multi-scenario analysis, target settings (emission, impact, costs, etc) and cost-benefit analysis
- Identifying specific mitigation measures for all atmospheric pollutants across all economic sectors that achieve the environmental targets at least costs
- Introduction and evaluation of economic instruments (emission trading)
- Evaluation of the level of social equity in policy development
- Evaluation of relative contributions from different geographycal areas (even at hemispherical level)

The workshop would address the issues of reducing air pollution levels to a given standard for India, the worst-affected areas in India, the cheapest way to reduce the health impacts of air pollution on India's population, the ways to control air pollution to maximize the reduction of GHGs. For more information and to conduct independent analyses, the GAINS model and documentation could also be accessed freely online at http://gains.iiasa.ac.at.

WORKSHOP OBJECTIVE, COVERAGE AND DELIVERABLES

- The workshop will offer insight into the methodology and practical hands-on experience to users of IIASA's GAINS model.
- Use of GAINS model for estimation and projection of emissions of air pollutants and GHGs, costs of emission control strategies, and the resulting environmental impacts.
- To facilitate the design of emission control strategies that balance emission control measures across the various sources in the most cost-effective way.
- Assessment of risk associated with air pollution on human health in India.
- Understanding of the associated environmental and health impacts of air pollution control measures and enhance role of integrated assessment in decision making process.
- What are the current and projected trends in Indian megacities with respect to greenhouse gas emissions, ground-level ozone pollution, energy use, sulfur dioxide aerosols, and population in the next 20, 50, and 100 years?

- Should air pollution and climate change be treated as separate issues?
- Ambient Air Quality Monitoring System (AAQMS) and Source Apportionment (SA) Network
- Is there an array of cost-effective options available to simultaneously address the issues of human-induced climate change and air pollution?
- Exploring available cost-effective control measures.

After the successful completion of the five-day workshop in the GAINS model the representatives from central and state pollution control boards, central and state electricity regulatory commissions, state nodal agencies, researchers and academicians will be able to use the GAINS model for air pollution and GHG mitigation strategies at regional, state/province and national level. They will be able to evaluate cost for any specific policy scenario and analyze the associated impact on environment and human health.

PROSPECTIVE PARTICIPANTS/BENEFICIARIES

The primary audience includes national and regional experts who analyze and process data for the whole air pollution cycle at national and regional level. The workshop would be useful for scientists, policymakers,Economists, Health Personnel, Agriculture Scientist,industry, NGOs, civil servants, representative of central and State Pollution Control Board and regulatory authorities, representatives from state nodal agencies (GEDA, MEDA, PEDA, etc.), researchers involved in air pollution and climate change studies, academicians and consultants.

SPEAKERS

1. Prof Sagnik Dey, Centre for Atmospheric Sciences, IIT Delhi
2. Dr Fabian Wagner, International Institute for Applied Systems Analysis (IIASA), Austria
3. Dr Anil Bhanarkar, Senior Principal Scientist, National Environmental Engineering Research Institute (NEERI), Nagpur
4. Dr Gregor Kiesewetter, International Institute for Applied Systems Analysis (IIASA), Austria
5. Dr Pallav Purohit, International Institute for Applied Systems Analysis (IIASA), Austria
6. Dr Dipanjali Majumdar, Senior Scientist, National Environmental Engineering Research Institute (NEERI), Kolkata
7. Representative from CPCB

ABOUT TIFAC

Technology Information, Forecasting and Assessment Council (TIFAC), an autonomous organization under the Department of Science and Technology (DST) , Government of India was established in 1988. TIFAC is a think tank within government setup which looks up to technologies on the horizon, assesses the technology trajectories and supports technology innovation in elect areas of national importance.

TECHNOLOGY INFORMATION, FORECASTING AND ASSESSMENT COUNCIL (TIFAC) (An autonomous body of Department of Science & Technology, Govt. of India) A-Wing, Vishwakarma Bhavan, Shaheed Jeet Singh Marg, New Delhi-110016, www.tifac.org.in