HKUST
環境研究所
INSTITUTE FOR THE ENVIRONMENT

Division of Environment and Sustainability

RAQM-5 Hong Kong Forum

OPPORTUNITIES IN THE GREATER BAY AREA:
Regional Collaboration & Exposure Management Breakthrough

20 November 2017
Event summary report

BACKGROUND

The conversation around air pollution has captured dramatic attention over the years, and more resoundingly in the recent years, as more information are made available to the public through intently emerging research and technology. Along with the rapid development of densely populated areas in the world, including China and Hong Kong, is the urgent demand to make use of scientific data in helping identify and manage exposure to the various air pollutants that have long posed a threat to public health.

The International Symposium on Regional Air Quality Management in Rapidly Developing Economic Regions (RAQM-5) recognizes the value of international collaboration in developing long-term solutions to address pressing air quality concerns. In its tenth year since establishing its renowned global symposium, it once again brings together experts in the field of air pollution monitoring and control, to discuss the latest developments concerning air quality management. As a culminating activity, a special summary forum, organized by HKUST, places focus on key health-relevant actionable insights drawn from the four-day event, with five of the symposium speakers presenting succinct information from their respective areas of study. Their inputs are aimed at enriching public knowledge, as well as supporting the private and government sectors' air pollution management efforts in Hong Kong.

Reference Materials:
The 5th International Symposium on Regional Air Quality Management in Rapidly Developing Economic Regions: https://5raqm.jnu.edu.cn/en/index.php

PROGRAMME

09:15 am	Reception			
09:15 am	Opening remarks			
09:40 am	Presentations			
	Air Pollution & Lung Health	Dr. Roland Leung	PPT	Video
	Efforts to Tackle Air Pollution in China	Prof. Zibing Yuan	PPT	Video
	Air Quality in Hong Kong Past, Present and Future	Prof. Alexis Lau	PPT	Video
	Exposure to Air Pollution and Health Implications	Prof. Chris Frey	PPT	Video
	USEPA Perspective and Emerging Air Sensor Technology	Dr. Gayle Hagler	PPT	Video
11:00 am	Panel discussion and Q&A session	Moderator: Prof. Jimmy Fung		Video
11:30 am	Meeting ends			

EVENT MATERIALS

Download event materials and media reports at: http://www.envr.ust.hk/RAQM5HK.html

SPEAKERS *(By last name in alphabetical order)*

Prof. Christopher Frey is a Futrell Distinguished University Professor of Environmental Engineering at the North Carolina State University. His research interests focus on areas such as measurement and modelling of real-world fuel use and emissions of on-road and non-road vehicles; and exposure and risk analysis. Prof. Frey currently serves on the United States Environmental Protection Agency' (USEPA's) Clean Air Scientific Advisory Committee (CASAC). He is also a member of World Health Organization working group on exposure assessment.

Dr. Gayle Hagler is an Assistant Laboratory Director for air, climate and energy for the National Risk Management Research Laboratory at the United States Environmental Protection Agency (USEPA). Knowing air pollution and its health risk, her research develops sensors to study ambient air quality, quantifying source emissions and measure air pollution all over the US and other countries. Dr. Hagler was awarded as the Presidential Early Career Awards for Scientist and Engineers under the Obama Administration for her pursuit of innovative research and scientific leadership.

Prof. Alexis Lau is the Associate Director of Institute for the Environment and Director of the Atmospheric Research Center. He specializes in regional and urban air quality, weather and climate. His research has been regularly used by local and regional governments, including the 2010 Asian Games air quality study and 2013 Hong Kong Clean Air Plan. He is also a member of the Scientific Advisory Group of the World Health Organization Panel on the development of a Global Platform on Air Quality and Health, and an expert member of the Environmental Sustainable Transport Program of the United Nations (UN) Center for Regional Development.

Dr. Roland Leung is a Specialist in Respiratory Medicine, an Honorary Associate Professor, Department of Pediatrics, PWH, CUHK; an Honorary Consultant of Hong Kong Sanatorium and Hospital and Hong Kong Adventist Hospital, and a Council Member of the Institute of Allergy. His medical and surgical services include skin allergy test, lung function test and bronchoscopy, where air quality concerns his profession on public health protection.

Prof. Zibing Yuan is a professor for School of Environment and Energy at the South China University of Technology. He obtained his doctoral degree at Hong Kong University of Science and Technology, his research interest continues to focus in areas such as sources quantification and verification of atmospheric reactive organic compound, and study on nonlinear control of ozone in photochemical active zone. Prof. Yuan is the academic committee member for RAQM-5.

EVENT HIGHLIGHT

The economic burden attributed to public health concerns can no longer be ignored. As one of the fastest-growing countries in the region, Hong Kong is driven to proactively pool its resources to support a viable growth. In 2013 alone, it was estimated that fatalities and hospitalizations due to pollution-related illnesses cost the Hong Kong economy a total of $3.9 billion dollars—a number that over a few years, could be significantly reduced with effective public information drive and a multi-faceted controls solution approach.

On Monday, November 20, we were honored to host the summary presentations of five distinguished speakers of the 5th International Symposium on Regional Air Quality Management in Rapidly Developing Economic Regions (RAQM-5). One by one, they talked about air pollution from their professional perspectives, the challenges they see in terms of pollution controls development, and the next steps—from the individual to the national level—they see fit to contribute to a holistic approach to reducing the impact of air pollution in Hong Kong.

Seminar moderator Dr. Jeanne Ng, Director of Group Sustainability at CLP Power Hong Kong Limited, opened the session by highlighting China's initiative to actively participate in the global imperative to promote cleaner air, and how its involvement in the RAQM-5 internal symposium is a continuing positive step towards environmental sustainability. The wealth of knowledge provided by the over 800 professionals—academicians, doctors, policy-makers, etc. from 13 countries—who graced the event was, above all, directed towards helping improve the quality of life of the population. She underscored among the HKUST community the appreciation necessary to take data relevant to the Hong Kong population, and from this appreciation, build on the recommendations and practices that can ultimately influence the way regional and global air quality management programs are designed and executed.

Breathing Sustainability in Hong Kong

Harvesting data from different sources, Dr. Roland Leung began the special summary forum by highlighting the extent of damage, in terms of worldwide cause of disease and premature death, caused by pollution. He stressed, from an article published by the Lancet Commission, that diseases caused by pollution were responsible for an estimated 9M premature deaths in 2015, which was 16% of all deaths worldwide.

Dr. Leung reported that 80% of diseases that lead to death due to outdoor air pollution are cardiovascular in nature, while 20% of which are respiratory disease. Children are not exempted from these; in fact, Dr. Leung stressed that children are more vulnerable to the effects of air pollution due to physiological makeup and activities. He calls attention to the irreversible decrease in lung function as a result of prolonged exposure of children to air pollution.

While Hong Kong has come a long way in its pursuit of a cleaner air, with the gradual drop in ambient air pollutants over the last ten years, there has been an observed shift in pollution levels—with a parallel increase of the pollutants observed in the Central and Western provinces.

It is yet to be discovered whether a decline in health effects and a change in epidemiology of asthma and allergic diseases will follow the reduced levels of air pollutants in Hong Kong.

Moving forward, Hong Kong, whose population was long threatened by the high mortality rates caused by respiratory diseases, will definitely benefit from a better understanding of the healthcare burden caused by air pollution.

Ecological Civilization as a National Strategy

The concept of "ecological civilization," in response to the need to reduce the pollution levels, was put forward by Prof. Zibing Yuan, who says that there needs to be an economic collaboration to bring this national strategy to reality.

The development model, he stresses, is not simple, and requires accuracy and a data-driven plan to sustain an air pollution control program.

Providing a history of policies and programs aimed at addressing air pollution in China, including the Air Pollution Prevention Action Plan (APPAP), Prof. Yuan expressed optimism over the developing awareness and action plans towards solving this national problem. For one, he shares that Hong Kong and Guangdong, in the past 20 years, have built up a very good research collaboration in terms of air pollution prevention and control.

As Hong Kong continues to face rapid developments along with the rest of the world, it is important for it to conscientiously take its time and effort to grow in harmony with the environment, and to do its “generation’s share” to protect it.

While ambitious plans are being laid to work, Prof. Yuan calls for a strengthened collaboration, and he recommends air pollution control to be implemented in a more regionally unified manner.

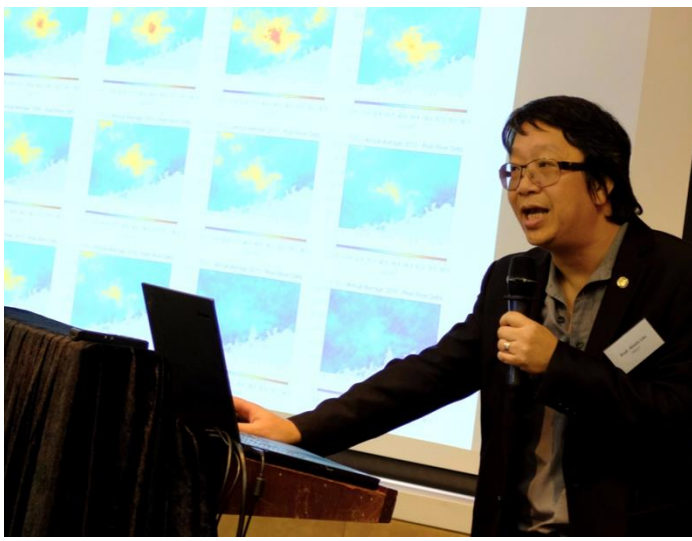
Controlling Air Quality Together

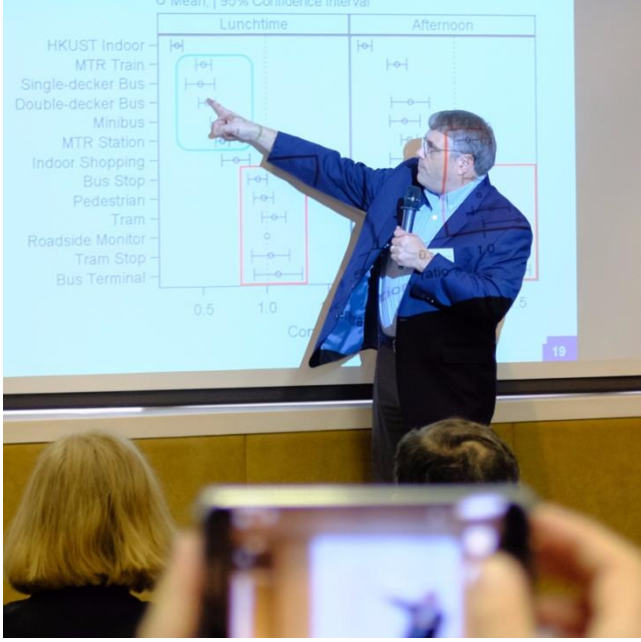
So where does Hong Kong stand today in terms of air quality? This was the question addressed by Prof. Alexis Lau, while reinforcing critical statistics on the healthcare burden caused by air pollution in the city.

According to him, Hong Kong has been doing a lot of work in terms of air quality management, citing the HK Air Quality Objectives, aimed at regularly reviewing means to improve the air quality in Hong Kong.

The good news, as a result of this shared awareness to combat air pollution, is that there has been a significant drop of air pollutants due to controls put in place, as evidenced, in part, by emission changes observed between 2010 and 2015 in the transport, power, and marine sectors. He added that major improvements have been observed starting 2007, in the Pearl River Data area, and that Hong Kong’s best practices in air control have since been adopted for use to improve other parts of China.

Prof. Lau also urged the Hong Kong government, in its efforts to sustain these developments, to look beyond concentrations of air pollutants by focusing as well on where people are actually living to get a true picture of how pollutants are distributed. He also provided a preview of the innovative PRAISE HK project currently being developed by the Hong Kong University of Science and Technology Institute of the Environment, which aims to measure pollutant concentration down to the street level and empower the public with this information, so they can better manage their exposure risks.





Understanding Exposure and Human Health

Building on the idea of public empowerment, Prof. Christopher Frey shared the importance of a personalized approach to managing air quality, which begins with an understanding of the kinds of exposures that people encounter.

Prof. Frey further shared the developing field of exposure science – using scientific evidence to assess the hazards to human health from exposure and air pollution.

He explored the relationship between air pollution and harm, and stressed the importance of looking at closed microenvironments—various areas that are actually populated by people and where most people spend 80% of their time – to characterize the different concentrations of air pollution and identify its possible sources and health implications.

He reiterated the presence of fine particles even when indoors, and cited his recommendation to use exposure assessment in developing an integrated systems approach to exposure science, envisioning how it can further empower both the individual and the government in making decisions concerning air quality standards.

The Collaborative Future of Air Quality Monitoring

Calling to mind the value of shared knowledge and community, as explained in various contexts by the previous speakers, Dr. Gayle Hagler presented relevant technological advancements and the collaborative ways in which these may be maximized to manage air quality.

She presented the evolving innovation around air sensors, and the future of these technologies—mobile, consumer-friendly, low-cost. While these fast-emerging developments are helping involve more people or “citizen scientists” in the national effort to manage exposure to air pollution, they also demand a unified means through which data gathered from these technologies may be accurately communicated and interpreted.

Assimilation of data from these multiple sources, according to Dr. Hagler, will require an active dialogue with the community, to explore the best practices in interpreting data gathered from the constantly evolving air monitoring technologies.

Furthermore, Dr. Hagler sees it the EPA’s responsibility to provide guidance to tech developers, as well as in regularly reviewing related laws, to continuously contribute to the growing body of knowledge in air quality control.

PANEL DISCUSSION

Following the insightful presentations was a panel discussion, moderated by Prof. Jimmy Fung, Head, Division of Environment and Sustainability of Hong Kong University of Science and Technology.

Questions raised by the audience included implications of different variables to the development and continuity of existing air quality efforts: government directions, increasing number of vehicles, policy reinforcements, technologies, policies, public reception and buy-in, among others. Here are some of the key takeaways shared by the panelists during the session:

- Air quality monitoring sensors are set up for a specific purpose/measurement. They measure overall averages to provide an indication of the population exposure. There can be hot spots where concentrations are higher. Central site monitors, while they don't necessarily represent the magnitude of concentration at a hot spot, are often correlated with those concentrations.
- For increasing vehicles being a burden on air quality efforts: It depends critically on the emission standards for the new vehicles coming in. With Hong Kong having newer vehicle fleets, it is in a good position to sustain its efforts.
- Business cases to consider: Improvement in environmental information and quality of life as a direction, government, growth of smart technology.
- Collaboration is very important. We need to use something to drive a harmonized approach to air quality management.
- We need to work with the health community to incorporate a more health-targeted outcome for our air quality initiatives.

The views expressed in this summary report are those of the speakers and moderators, and do not necessarily represent the opinions of the event organizers.