Symposium Report

Experts Symposium on Air Quality
Hong Kong Exhibition & Convention Centre
9 January 2009

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View from the Symposium venue, 9 January 2009

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CIVIC EXCHANGE The Hong Kong Jockey Club Charities Trust
EXECUTIVE SUMMARY

On 9 January 2009 in Hong Kong, Civic Exchange organized an Experts Symposium on Air Quality. The Symposium was the first day of a two-day event on air quality called ‘THE AIR WE BREATHE – a public health dialogue’. The second day was an open public conference. The two-day event was organized by Civic Exchange, funded by the Hong Kong Jockey Club Charities Trust, and supported by leading health and atmosphere research institutions.

The event attracted eighty-one delegates from science, technology, transport, marine and utility businesses in Hong Kong; health and legal professionals; international, Mainland and Hong Kong researchers and academics; and representatives from the Hong Kong Government, advisers to the national authorities, Guangdong and other municipal or provincial authorities, and the European Parliament.

This report provides summaries of the four symposium sessions:

(a) The Importance of Protecting Public Health in Framing Air Quality Policy,
(b) Protecting Public Health in AQ Policy – Economics, Politics, and Law,
(c) From Policy to Action in Bangkok, Beijing, Guangdong, and the EU, and
(d) Making it Happen in Hong Kong (small group discussions and final plenary session).

Public policy implications were drawn out of the deliberations, covering nine key areas, as follow:

1. **Public Health**: Air pollution is a cause of illness and death in Hong Kong, resulting in significant direct and indirect economic costs. Health impacts are multi-dimensional, with acute and chronic impacts. No safe threshold levels of pollutants have been identified in public health research. Hong Kong citizens depend on the Government to represent the public interest on air quality, as action at the personal scale has limited efficacy.

2. **Economics**: Many air pollution-related deaths, illnesses, and costs are avoidable, but public policy has not adequately addressed the externalisation of these costs. Pollution management is not a burden on the economy but pollution itself is. Pollution impacts manifest themselves inequitably, with the poor and vulnerable bearing a higher burden. The current financial crisis and subsequent large-scale public investment by Government in response represents an opportunity to set the economy on a greener, less polluting footing.

3. **Institutional impediments**: A number of factors in the bureaucratic and political machinery of Hong Kong have the potential to undermine efforts to improve air quality. These include insufficient health-sciences input; a technology-focused approach (rather than a standards-focus); lack of bureaucratic incentive for accountability; a ‘volume’ approach that targets high-volume pollutants rather than high-health-impact pollutants; a lack of urgency about the problem; and no whole-of-government approach to air quality.

4. **Emerging issues**: A number of issues not yet on the policymaking radar should be dealt with in a co-benefits approach, including interactions between pollutants; fine and ultra-fine particulates; vapour-phase emissions from traffic; and climate change and its relationship with air pollution.

5. **Critical facets for a successful management programme**: Include strong leadership and political vision; a strong ongoing research programme; a regularly updated regulatory regime; a multi-pronged approach; a standards-driven approach that pushes technology development (rather than a technology-driven approach where standards are based on the best or average gains that current technology could deliver); a systems approach to policymaking and policy-implementation; and planning and prioritisation (given that the vast disparity between current levels of pollution in Hong Kong and the WHO guidelines means it will take many years of sustained effort for Hong Kong to have healthy air).
6. **Reform of Air Quality Management legislation:** The main legislative instrument (the Air Pollution Control Ordinance) could be improved to better aid air quality management. Areas of reform include clearer reference to public health; regular review; more objective procedures; streamlined processes for updates; more serious consequences for breach and incentives for control measures to be enforced; and integration with other environmental legislation.

7. **Monitoring and data collection:** Effective management of air quality requires up-to-date pollutant inventories and ongoing monitoring to guide the implementation (and if necessary alteration) of control strategies. There is potential for Hong Kong to rationalize and strengthen its monitoring activities.

8. **Public Opinion:** Increased public awareness has coincided with a dramatic rise in public concern about air pollution. This concern is felt across all sectors of society. Air pollution makes Hong Kong a less desirable location for both locals and international talent, and Hong Kong people believe air pollution is damaging their quality of life. However, the concerns of the vast majority are not reaching people in positions of influence. The general public regard air quality as a problem – public sector workers show less interest. Dissatisfaction with government and business efforts to deal with air pollution has risen significantly. The public has realized the complexity of the problem and wants Government to listen most to independent environmental experts in formulating pollution management policies.

9. **Linking to developments in Mainland China:** The National Government is supportive of air pollution management, as a result of its experience with the Beijing Olympics and as a result of the importance attached to scientific research, social welfare, ecological integrity, and co-control measures set out in President Hu’s Scientific Development concept. There are opportunities for Hong Kong to join multi-city Mainland research initiatives such as the CAPES project.

This summary is based on presentations and participants’ comments from the Experts Symposium and does not necessarily represent the views of Civic Exchange, the Hong Kong Jockey Club, or participants’ organizations, nor a consensus of all participants.
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PUBLIC POLICY IMPLICATIONS OF THE EXPERTS DELIBERATIONS

1. Public Health

− **Cause of illness and death:** There is a close relationship between air pollution and illness. Air pollution is a significant source of death and disease in Hong Kong.

− **Direct and indirect economic costs:** Air pollution is a contributing cause of diseases that incur major healthcare costs in Hong Kong. Air pollution results in indirect costs and losses to Hong Kong, such as in the areas of productivity, tourism, international recruitment, and local staff retention. Most studies of the impacts of air pollution on public health are conservative, as they tend not to account for costs of self-treatment, purchases of filtering equipment, loss of mobility and quality of life, and the cost of caring for sick relatives. The economic impacts are a bigger problem for low-income families if they must miss days of work.

− **Health impacts are multi-dimensional:** There are demonstrated impacts from acute exposure on high-pollution days. More worrying are the impacts from chronic exposure to average pollution days. Reducing moderate levels, which is the biggest portion of the population is exposed to, often has a bigger effect than reducing only the most severe exposures, which affects few people.

− **No safety threshold:** There has been a paradigm shift in the health sciences from a ‘threshold concept’ (below which the air was believed safe) to a “no threshold concept”. In other words, we can’t speak of a ‘safe’ level of pollutants. There are no known thresholds for pollution health effects, so some susceptible individuals are affected at quite ‘low’ levels and many people are affected by so-called ‘safe’ levels due to chronic exposure.

− **Limited effective personal actions:** There are very few measures that individuals can take to protect themselves adequately from the impacts of air pollution on their general health. Individual measures, e.g. in-house filters – are not a satisfactory substitute for overall air quality improvements. Avoiding outside activity is impossible for some outdoor workers and anyone who must venture outdoors to catch public transport. Avoiding exercise has other deleterious health consequences and represents a loss of quality of life.

2. Economics

− **Avoidable costs:** Many air pollution related deaths, illnesses, and costs are avoidable. If air pollution improved from existing average levels to meet WHO guideline levels, Hong Kong could avoid 6.8 million doctor visits, 64,000 hospital bed-days, 1,600 deaths, and HK$2 billion in direct health costs (healthcare spending and lost productivity) and HK$19 billion in indirect health care costs (value of statistical lives lost, willingness to pay to avoid health effects).

− **Pollution management is not a burden on the economy:** It is a misconception that management of air pollution impedes the economy. US experience shows that in every case, the economic costs of improving air quality are outweighed by the benefits by many times. This is likely to be true in other jurisdictions. In California, as air quality improved, so did GDP per capita.

− **But pollution is a burden on the economy:** The health costs of air pollution are a heavy burden on the poor, because of lost earning days and having to support the pollution-related costs of sick relatives. The possibility of wealthy or highly skilled workers leaving because of air pollution hurts Hong Kong’s economic competitiveness.

− **Failures of current economic approaches:** The costs of air pollution are not borne directly by those who benefit from air pollution. “Polluter pays” should be the policy foundation. Insufficient attention has been paid to the externalities of pollution. Parts of Mainland China have lost GDP growth because of pollution.
Inequity: The burden of air pollution’s health impacts falls heaviest on vulnerable groups – the very old, the very young (including unborn babies), and the poor. However, it is not just these groups who are at risk, as air quality affects a broad section of the general public.

Opportunities in the current crisis: We can expect to see Hong Kong-owned and managed businesses on the Mainland asking the Government for assistance during the current financial crisis. We can also expect to see the Government inject huge sums of money to provide employment opportunities during the economic downturn. This represents a perfect opportunity for the Government to drive forward a greener economy by attaching air pollution management conditions on financial assistance and directing its investment to green technologies and by making public health and environment sustainability crucial objectives of infrastructure projects.

3. Institutional impediments

Insufficient health-sciences input: The policy-making process that moves the air pollution problem from science to advocacy to policy to action to benefits is failing at the point between advocacy and policy. The Government sees air quality as an environmental issue rather than a health issue. Policymaking for air quality is not sufficiently grounded in scientific health-based evidence. Government health agencies are not sufficiently engaged to influence air pollution policy.

Standards drive technology, not the other way around: Policy shouldn’t be based on perceived ‘achievability’ based on current technologies. Forward thinking policy can drive new and more effective technologies. The focus should be on levels of exposure necessary for good public health outcomes.

Institutional inertia: There is a lack of bureaucratic incentive to strive for accountability: if officials don’t take action, they don’t face any negative consequences. But if they set too strict a target and fail to meet it, they will be blamed. Policymakers and regulators are afraid of mistakes, so they always tend to go back to the pre-existing ideas.

‘Volume’ approach is flawed: Politically, the high-volume pollutants are the easiest targets. The volume approach gives Hong Kong the opportunity to blame its problems on Guangdong or to concentrate on a narrow field of interest, while ignoring the roles of efficient building design, urban planning, and traffic management. But from a health point of view, taking measurements of the total volume of pollutants in the atmosphere and targeting the high-volume chemicals does not always equate to better public health. For example: NO\textsubscript{X} and SO\textsubscript{2} are high-volume pollutants but particulates are the most damaging to public health. The volume approach is one-dimensional, whereas a multi-dimensional approach is crucial given that Hong Kong has a variety of different types of pollution affecting different segments of the population in different ways.

Lack of urgency: Even if we accept that pollution is trending downwards (and this is open to question), the trends are so slow that it will take decades to a century before Hong Kong reaches the current WHO guidelines. In the meantime, these guidelines may have been re-evaluated, given that there is no safe pollution threshold.

No whole-of-government approach: The Health Department has no effective role in the development of air pollution policy. The Environmental Protection Department (EPD) develops air quality policy but has neither mandate nor expertise to manage public health. There should be greater synergy amongst departments; e.g. amongst the Planning, Transport, Health, and Environmental Protection Departments. The policymaking process for the development of large-scale infrastructure and energy projects does not adequately address public health and health-related environmental issues – the end result is policies that favour more roads and bridges for cars and trucks, and policies that disadvantage rail lines for freight and passengers.

4. Emerging issues:

Not yet on the policymaking radar:
o Interactions between pollutants,
  - Fine and ultra-fine particulates (particulate matter less than 2.5 and 0.1 micrometres respectively),
  - Vapour-phase emissions from traffic, and
  - Greenhouse gas emissions, climate change, and relationships with air pollution (e.g. black carbon).

- **Co-benefits approach:** The emerging issues would be best addressed in an integrated manner using a co-benefits approach.

- **Long-term solution:** ‘Defossilize’ the Chinese economy, as fossil fuels are a common link in all of the emerging air quality issues. The current approach of governments to ease the financial crisis by huge government investments represents an opportunity for government to direct the economy along a more sustainable, less fossil-fuel-dependent pathway. As a major world banking centre, Hong Kong is ideally placed to play a role.

5. **Critical facets for a successful management programme:**

- **Strong leadership from Government and legislators** to represent the public interest against private vested interests. Strong leaders would acknowledge the ineffectiveness of past policy to deal with the externalisation of environmental costs.

- **A broad forward-thinking political vision**, playing to Hong Kong’s strengths; e.g. its population density, perfect for mass transit public transport. Hong Kong could be a model city for the rest of China.

- **A strong ongoing research programme** that accompanies implementation. The interface between science and technology is critical. Policymakers must be exposed to recent science.

- **A regularly updated regulatory regime** that is reviewed and, if necessary, changed on the basis of new and continuing research.

- **A multi-pronged approach**, given the different sources and types of pollutants, different health effects of each, and the different populations and sectors affected. A multi-pronged approach would consider preventative measures and technologies, tailpipe solutions, siting of polluting plant, building design and urban planning, management of transport, traffic and roads, and shipping and port issues. Piecemeal development and lack of accountability lead to inefficiencies and avoidable legal actions.

- **A region-driven approach** to action and dialogue. Cooperation in the Pearl River Delta could be modelled after established regional environmental initiatives such as the Commission for Environmental Cooperation (Canada—USA—Mexico) and the European Union’s environment programme.

- **A standards approach** to drive technology development (rather than a technology approach where standards are based on the best or average gains that current technology could deliver).

- **An systems approach to policymaking** and policy-implementation; for example integration of health and environmental considerations, and integration of various environmental concerns, including deep reflection on trade-offs and of co-benefits, not only to develop more effective, more broadly applicable solutions but also to identify cost savings.

- **Planning and prioritization** - the vast disparity between current levels of pollution in Hong Kong and WHO guidelines mean that it will take many years of sustained effort for Hong Kong to reach the levels currently considered safe by the WHO. Suitable starting points include local initiatives for desulphurisation of power plants (planned for the next few years); transport and traffic management; improving rail infrastructure; electrification of public and private vehicles; building energy efficiency, including efficient use of air conditioning; aviation; and shipping.
Empowerment of public concerns so that policymakers are able to more accurately gauge the intensity of public concern and feel more confident to act on the mandate of concern.

Risk communication to provide the public, media and policymakers with accurate and timely information about the impacts of air pollution on public health.

6. Reform of Air quality management legislation
- Clear reference to public health as the purpose of air quality management.
- Regular review to ensure technological development is not held back by antiquated standards.
- More objective procedures, with reference to international standards.
- Streamlined processes for updates.
- More serious consequences for breach.
- Legal incentives for control measures to be enforced (by both polluters and the Government as administrator of the control regime).
- Integration with other environmental legislation.
- Regulate pollutant combinations rather than individual pollutants.

7. Monitoring and data collection
The Rationale for monitoring & data collection:
- Identify and quantify sources and source-contributions and risks.
- Characterize emission trends and forecast future air quality.
- Understand atmospheric processes.
- Develop and test air quality models.
- Estimate immediate and long term hazards.
- Guide the implementation of control measures. and
- Evaluate the effectiveness of a pollution control strategy, in the long run, by relating the strategy to effects on public health.

Potential improvements to monitoring regimes in Hong Kong:
- Increase collaboration amongst the various monitoring facilities of different institutions; e.g. HK Observatory, EPD, and CLP.
- Expand measurement parameters for continuous instruments, and reduce averaging times for data reporting to enable better understanding in real time of the relationships with nearby resources.
- Translate data into policy-relevant findings.

8. Public Opinion:
Key messages:
- Increased concern – Increased public awareness has coincided with a dramatic rise in public concern about air pollution between 2001 and 2008. Amongst those respondents earning more
than $70,000 a month, 40% are seriously considering leaving. 40% of those with a master’s degree are considering leaving HK. The real economic costs of air pollution will be quite high.

− **Whole of Hong Kong** – The public’s concern about air quality is felt across all sectors of society and more than 90% of those concerned are born in Hong Kong or Mainland China. Everyone is affected by and concerned about air pollution, not just the wealthy or expats. The Government views pollution as an expat complaint, but having to take a day off sick has a much heavier impact for a low-income family.

− **Less desirable location** – Hong Kong people believe air pollution makes Hong Kong a less desirable location for both locals and international talent. 2% of respondents said they were planning to leave because of air pollution concerns. 6% are seriously considering leaving. In total, 20% are considering leaving (i.e. ‘planning to leave’, ‘seriously considering leaving’, and ‘considering leaving’) or about 1.4 million people in total.

− **Damaging quality of life** – Hong Kong people believe air pollution is damaging their quality of life.

− **Concerns not heard** – The concerns of the vast majority are not reaching policy-makers or the media, indicating serious problems in trust and communication. Only 1 in 4 never talked to anyone about their air quality concerns, but 95% never talked to media, the Government, or District Councillors. Why are so few people saying so little to decision makers?

− **Public sector differs** – Public sector employees tend to rate air pollution as of less concern than the general public. The general public regard air quality as a problem – public sector workers show less interest. There are mismatched priorities if you keep getting sick from air pollution, but the Government tells you, ‘Don’t worry. We have the longest life expectancy in the world’.

− **Rising dissatisfaction** – Dissatisfaction with government and business efforts to deal with air pollution has risen significantly since 2001.

− **Experts are crucial to setting policy** – In the 2001 survey, most people felt Government should listen most to public opinion. However, in 2008, the public want Government to listen most to independent environmental experts. The public has realized the complexity of the problem.

9. **Linking to developments in Mainland China:**

**The Beijing Olympics experience** – Keys to success included: a regional approach (each of the surrounding areas had different pollution sources that had to be dealt with differently); cost benefit analysis; political will; systematic research; public concern and pressure; as well as favourable meteorological conditions.

**Visions and priorities at the national policy-making level:**

- **Economics** – Reducing emissions and greenhouse gases will lead to long-term economic benefits.

- **Start at the beginning** – Ideally, manage pollution at the beginning of the combustion process, not at the tail of the pipe.

- **Adopt a “co-control” strategy** – In making the case for large investments in environmental management, we should aim to maximize the benefits over a range of problems. What’s the use of reducing NO2 if we produce more CO2? We need to integrate management of air pollution and greenhouse gas emissions.

- **Role of science and research** – The scientific community should play a role in educating the Government. The Government should take advice from researchers on environmental issues, rather than creating the agenda and the ‘answer’ first, then funding research to support the pre-determined outcome.
- **‘Development’ includes social and ecological elements** – President Hu’s *Scientific Development* approach emphasizes elements of development other than GDP growth, including social welfare and ecological integrity. This approach could be applied in many areas of environmental concern, including the management of air quality, freshwater reserves, and marine fish stocks.

- **Cross-city learning** – There is potential for Hong Kong to become involved with cross-city Mainland research on air quality such as the CAPES project (“China Air Pollution & health Effects Study”).

This summary is based on presentations and participants’ comments from the Experts Symposium and does not necessarily represent the views of Civic Exchange, the Hong Kong Jockey Club, or participants’ organizations, nor a consensus of all participants.
INTRODUCTION TO SYMPOSIUM SESSIONS

The Experts Symposium on Air Quality was a closed-door invitation only gathering of local and international experts on air quality held on Friday 9 January 2009. The Symposium was the first day of a two-day event on air quality called ‘THE AIR WE BREATHE – a public health dialogue’. The second day, Saturday 10 January, was an open public conference. The two-day event was organized by Civic Exchange, funded by the Hong Kong Jockey Club Charities Trust, and supported by:

- Department of Community and Family Medicine, School of Public Health, Chinese University of Hong Kong (CUHK),
- Department of Community Medicine, School of Public Health, Li Ka Shing Faculty of Medicine, University of Hong Kong (HKU),
- Institute for the Environment, Hong Kong University of Science & Technology (HKUST),
- Research Centre for Urban Environmental Technology & Management, Hong Kong Polytechnic University (HK Poly U),
- Hong Kong Thoracic Society,
- Hong Kong Transition Project at Hong Kong Baptist University (HKBU), and
- Clean Air Initiative-Asia for Asian Cities (CAI-Asia) Center.

81 delegates participated in the Symposium, including local and international experts with a wide-range of expertise, covering:

- Science, technology, transport, marine and utility businesses in Hong Kong,
- Health and legal professionals,
- International, Mainland and Hong Kong researchers and academics, and
- Representatives from the Hong Kong Government, advisers to the national authorities, Guangdong and other municipal or provincial authorities, and the European Parliament.

A full list of delegates appears in Appendix 1. Brief biographies of about 30 leading delegates appear in Appendix 2. Delegates came together to share information, network, develop a community of interest, increase the capacity of local experts, and to consider the policy needs of Hong Kong in order to improve air quality.

The programme was arranged in four sessions (see Appendix 3):

**Session 1: The Importance of Protecting Public Health in Framing Air Quality Policy**
Prof. Tony Hedley moderated a panel of special guest commentators comprising Dr WM Chan, Dr CM Wong, Prof. Ross Anderson, Dr Aaron Cohen, Prof. TW Wong, Dr John Froines, and Dr Quentin Chiotti.

**Session 2: Protecting Public Health in AQ Policy – Economics, Politics, and Law**
Prof. Bill Barron moderated the session comprising Dr Terry Barker, Dr Alan Lloyd, Dr Judy Chow, Dr John Watson, Mr Antonio da Roza, and Prof. Michael DeGolyer.

**Session 3: From Policy to Action and Review - Making it Happen**
Dr Christine Loh moderated a panel comprising Prof. Nuntavarn Vichit-Vadakan, Prof. Zhu Tong, Dr Hu Tao, Dr Allen Zheng, and Mr Anders Wijkman.

**Session 4: ‘Making it Happen in Hong Kong’**
Small group discussions and final plenary session.

The first three sessions proceeded with short (5-10 minute) presentations from the guest commentators followed by Question and Answer sessions and general discussion facilitated by the moderator. The small group discussions in the fourth session occurred in groups of about 10 to 12 participants, with a facilitator and note-taker assigned to each. Spokes-people from each small group reported back highlights from the group discussion to a plenary session.

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Summaries of each session are provided below. Where the guest commentators used PowerPoint presentations, these are provided on the Resources page of the Conference website: http://air.dialogue.org.hk/web/eng/resources/top.html

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SESSION 1 – THE IMPORTANCE OF PROTECTING PUBLIC HEALTH IN FRAMING AIR QUALITY POLICY

Moderated by: Prof. Anthony Hedley - Dept of Community Medicine, School of Public Health, HKU.

Panel Members and Session Summary

Panellists’ presentations are available from the Resources page of the Conference website: http://air.dialogue.org.hk/web/eng/resources/top.html. More detailed notes on each panellist’s presentation are provided after the summary.

(a) Dr WM Chan – President, Hong Kong Thoracic Society:

Patterns of Respiratory Illnesses in Hong Kong – In 2005, the Burden of Lung Disease Project showed that respiratory diseases are the top cause of mortality and hospitalization in Hong Kong: 28% of deaths and 16% of all inpatient bed days. Respiratory diseases now make up the largest share of the local healthcare burden. When we think about the cost of air pollution we cannot just look at the number of deaths. Other factors, such as mobility and quality of life, are also important. There is a close relationship between air pollution and morbidity. Hospital admissions for acute asthma episodes are closely correlated with WHO AQG exceedances.

(b) Prof. CM Wong – Dept of Community Medicine, School of Public Health, HKU:

The Application of Studies on the Health Effects of Air Pollution: Air pollution affects not just the respiratory system, but also the cardiovascular system. If air pollution improved from existing average levels to meet WHO guideline levels, Hong Kong would avoid 6.8 million doctor visits, 64,000 hospital bed-days, 1,600 deaths, and HK$ 2 billion in direct health costs and $19 billion in indirect health care costs. The standard methodology for translating public health research into policy and practice doesn’t seem to be working. Tools such as the Hedley Environmental Index may be useful to spark interest in policy reform.

(c) Prof. Ross Anderson – Epidemiology and Public Health, Community Health Sciences, St George’s, University of London:

Science to Policy: There has been a paradigm shift from a “threshold concept” (below which the air was believed safe) to a “no threshold concept”. New evidence using more sensitive epidemiological methods show that the health relationship goes all the way down to the bottom of the ambient air pollution range in cities. When there was a concept of a “safe level” – i.e. HK AQOs from the 1980s – the aim was to reduce “excessive exposure”. However, since then we have discovered that there is still a concentration-response level below the guideline. Reducing moderate levels, which the biggest portion of the population is exposed to, has a bigger effect than reducing only the most severe exposures, which affects fewer people.

(d) Dr Aaron Cohen – Principal Scientist, Health Effects Institute, Boston, USA:

Health Effects of Air Pollution in Asia: There is no basis for saying Asians are less susceptible to air pollution or that their respiratory and cardiovascular systems are different. In 2000, Asia accounted for two-thirds of global mortality due to urban outdoor air pollution (487,000 out of 800,000 deaths). Asian cities are more polluted compared to those in Latin America, Africa, Europe, and North America. The population susceptible to air pollution in Asia will increase, with over 100 million people becoming susceptible to cardiovascular disease.

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(e) Prof. TW Wong – Dept of Community and Family Medicine, Chinese University of Hong Kong:

Difficulties in Translating Scientific Evidence into Policy that Protects Health: The current review of the AQOs is not the first. In 1996, an AQO working group produced a report that has not been acted on. The current advisory panel has had little opportunity to review the AQOs; rather meetings have focussed on peripheral issues. In 2008, the Chief Executive side-stepped the review process by announcing that Hong Kong would adopt WHO’s Interim Target 1 standard (IT1) - the weakest standard in the WHO’s suite of standards. IT1 was intended for extremely polluted, developing countries, not highly developed economies such as Hong Kong. Institutional constraints make development of effective solutions difficult including: the insistence that targets should be ‘achievable’ (as opposed to being grounded in health-based evidence), the mentality that high standards are an impediment to seeking adequate funding from Treasury, the lack of attention to scientific evidence in policy-making, the propensity for Hong Kong to blame Guangdong, the lack of accountability in the governmental system, which encourages bureaucratic inertia.

(f) Dr John Froines – Director of the NIH Fogarty UCLA Program in Occupational and Environmental Health and Associate Director of the NIEHS Southern California Environmental Health Sciences Center:

Fine Particulates (PM$_{2.5}$): While particulate matter less than 10 micrometres (PM$_{10}$) has been the main focus of attention in relation to particulates, many studies have shown the significant health risks associated with PM of less than 2.5 micrometers (PM$_{2.5}$), including effects on the central and autonomic nervous systems, low birth weight and pre-term babies, increase in asthma and other respiratory disease, decrease in lung development in children, atherosclerosis (chronic inflammation of the arteries) exacerbation, and cancer. PM$_{2.5}$ is strongly associated with traffic emissions, therefore we cannot deal with PM$_{2.5}$ without dealing with the transportation issue. Emerging issues that we will need to address in the future are even smaller particles (‘ultra-fines’) and vapours, which may be significantly more toxic than PM$_{2.5}$.

(g) Dr Quentin Chiotti – Climate Change Programme Director and Senior Scientist, Pollution Probe, Toronto, Canada.

Risk Communication in Canada: Risk communication must begin with good quality, credible data, which Canada has developed. Canada also has an active medical profession that promotes pollution reduction and public health. However, it is critical to engage other sectors (environmental groups, industry partners and government departments to rewrite standards). The Province of Ontario decided that its old air quality health index (AQHI) was misleading the public because 92% of health effects occurred during good or medium days. This led to a 6-year initiative to develop a new health-based air quality index, presented like the ultra-violet index on a scale of 1 to 10, labelling health risk as low, medium, or high. This may be useful for Hong Kong.

(h) Question and Answer Session:

- **Can an individual protect themselves from exposure to air pollution?**

  Broadly speaking, no, though there are some minor steps people can take to reduce some of the health impacts (e.g. a healthy diet). There are both long-term and short-term impacts. For some people, air pollution is an added burden in a situation where they already have reduced resistance against illness due to other factors. Immunizing people against pneumonia, influenza, etc. will protect the population to some extent.

- **Are filters useful to prevent health impacts of air pollution?**
In Los Angeles, there are no filters that are effective enough to remove the ultra-fine particles to protect children. Indoor and outdoor pollution are connected. You neutralize the effect of filters if you open a window. Filters don’t remove vapours, which are also toxic.

- **Are hospitalization rates a conservative measure of assessing the impacts of air pollution?**
  
  Yes. Hospitalization rates are used because they’re relatively easy to assess but there are certainly effects further down the ‘pyramid of harm’.

- **Should public health departments drive air quality policy as much as environmental departments?**
  
  Yes. Currently there is no public health expertise in the Hong Kong Government influencing policy, and no strong input from the health sector in environmental policy in Hong Kong. People in high-level decision-making positions don’t believe this issue is a priority.

(i) **General comments:**

- **Air Pollution vs. Climate Change:** There are trade-offs between dealing with pollution and with global warming. There’s a compartmentalization of policy-making, where the global-warming people don’t communicate with the air-quality people. We need to integrate the two issues and think of win-win situations, such as using less fuel and higher fuel efficiency. Not all climate-friendly measures are health-friendly (e.g. change to diesel vehicles).

- **PM2.5 vs. ultra-fine particulates:** When PM 2.5 emissions go down, the number of ultrafine particles actually goes up.

- **CAPES:** The Ministry of Environmental Protection has provided funds for a time-study on acute health effects in nine Chinese cities, called the China Air Pollution & Health Effects Study (CAPES), led by Prof. CHEN Bingheng from Fudan University, Shanghai.
1(a) Dr CHAN Wai Ming (WM) – Patterns of Respiratory Illnesses in Hong Kong

- Doctors should go beyond medical practice to spread health messages by getting involved in community projects to educate the general public.

The Burden of Lung Disease Project

- The pattern of respiratory disease in HK is comparable to the risk factors in the World Health Organization Air Quality Guidelines (WHO AQGs).
- Respiratory diseases are the top cause of mortality and hospitalization in Hong Kong: 28% of deaths related to respiratory diseases compared to 4.4% for cancer.
- Respiratory diseases accounted for 16% of all inpatient bed days.
- Over the last 10 years, there has been a slow decline in mortality due to respiratory diseases, but the hospitalization rate has remained the same.
- Respiratory diseases now make up the largest share of the local healthcare burden.

Chronic Obstructive Pulmonary Disease (COPD)

- Caused by such factors as air pollution and smoking.
- COPD ranks second among respiratory problems in hospitalization rate.
- About 10% of cases can be helped directly by policy (education about smoking, air pollution standards).
- When we think about the cost of air pollution we cannot just look at the number of deaths. Other factors, such as mobility and quality of life, are also important.
- There is a close relationship between air pollution and morbidity.
- Hospital admissions for acute asthma episodes are closely correlated with WHO AQG exceedances.
- Ozone is a major culprit for COPD. WHO AQG exceedances lead to a 3.4% increase in hospitalization rate.
1(b) Dr WONG Chit-ming (CM) - Application of Studies on the Health Effects of Air Pollution

- Air pollution affects not just the respiratory system, but also the cardiovascular system.
- It affects all populations with the same risk factors all around the world. (See graph showing similar air pollution health risks in HK and London).
- 2004 research findings show there are health events caused by air pollution which were avoidable. If air pollution improved from existing average levels to meet WHO guideline levels, Hong Kong would avoid:
  - 6.8 million doctor visits,
  - 64,000 hospital bed-days,
  - 1,600 deaths, and
  - HK$ 2 billion in direct health costs (health care spending and lost productivity) and $19 billion in indirect health care costs (value of statistical lives lost, willingness to pay to avoid health effects).

Hedley Environmental Index (HEI)

- Purpose is to communicate costs to public and benefits of better air quality.
- Runs in real time, also displays historical levels.
- Policy makers can look at how costs can be reduced at different levels of pollution.
- We need a better translation of public health research into policy and practice.
- Standard methodology: Problem -> Science -> Advocacy -> Policy -> Action -> Benefit

  But there is a blockage here:

- Hopefully the HEI can spark interest and change policy.
1(c) Prof. Ross Anderson – Science to Policy

There are a number of steps to get from science to policy:

- Hazard identification,
- Exposure response,
- Health impact assessment for specified exposure scenarios (risk characterization),
- Cost/benefit effectiveness analysis,
- Development of air quality strategy,
- Implementation, and
- Evaluation in order to have accountability.

**WHO guidelines in perspective**

- Over the years, there has been a change in the metric of Particulate Matter (PM) measurement. The standards have become much stricter.
- There has been a paradigm shift from a “threshold concept” (below which the air was believed safe) to a “no threshold concept”.
- New evidence using more sensitive epidemiological methods show that the health relationship goes all the way down to the bottom of the ambient air pollution range in cities.
- American Cancer Society study shows long-term risk from particulate matter exposure and mortality.
- Interim targets towards WHO AQGs must be seen in the context of a continuous exposure-response relationship.
- There may still be effects below guideline levels.

**Implications of no threshold**

- When there was a concept of a “safe level” – i.e. HK AQOs from the 1980s – the aim was to reduce “excessive exposure”. However, since then we have discovered that there is still a concentration-response level below the guideline.
- In the graph showing the bell curve of population exposure, most of the exposure (the hump of the bell curve) occurs below the guideline.
- Reducing moderate levels, which the biggest portion of the population is exposed to, has a bigger effect than reducing only the most severe exposures, which affects few people.
- Europe is now focusing on population exposure reduction.
1(d) Dr Aaron Cohen - Health Effects of Air Pollution in Asia

Meta-review of 400 studies in Asia:

- Relative magnitude of health effects are the same as in the US and Europe.
- The data shows there is no basis for saying Asians are less susceptible to air pollution or that their respiratory and cardiovascular systems are different.
- Risk factors of short-term exposure to particulates vary little between different studies (0.4% to 1.5%).

Of all the continents, Asia bears biggest burden of disease from air pollution:

- 2/3 of global mortality due to urban outdoor air pollution (487,000 out of 800,000 deaths) in 2000 were in Asia. Out of the deaths attributable to indoor air pollution and the burning of solid fuels, about 63% (1,025,000 out of 1,619,000 deaths) worldwide were in Asia. Despite reductions in poverty, slum dwellers, especially women and children, bear the brunt of indoor air pollution.

Why are the impacts so large in Asia?

- Answer is simple. There is a lot of air pollution in Asia.
- Comparing WHO Interim Target (IT) 1, 2, 3 and AQG levels with air pollution levels of different cities around the world: Asian cities are more polluted compared to those in Latin America, Africa, Europe, and North America.

Predictions:

- Fossil fuel consumption will continue to increase.
- The share of coal as part of fossil fuel consumption will decrease, but because consumption will increase overall, total coal consumption will still increase.
- In Indonesia, the share of coal consumption as part of total energy use will increase.
- The population susceptible to air pollution in Asia will also increase, over 100 million people will be susceptible to cardiovascular disease. (50 million in China, 45 million in India, 7 million in Southeast Asia)
1(e) Dr WONG Tze Wai (TW) – Review of Hong Kong’s Air Quality Objectives

**Background:**

− In 2007, the HKSAR Government announced a consultancy study to review Hong Kong’s Air Quality Objectives (AQOs), which had not been updated since they were first implemented in 1987.

− In 1996, Profs Wong, Hedley, and other experts were invited to sit on an AQO working group. Though they produced a final report, but no significant changes were made to the AQOs.

− A decade later, the HKSAR Government is now conducting a study. The main issue is that they commissioned a private consultancy company with no track record of air pollution competence.

− Academics were invited to be part of an advisory panel to oversee the consultancy project, and there have been five meetings so far.

− Those meetings focused on air pollution control strategies, modelling scenarios and analysing the cost-effectiveness of different control options. They did not touch on the review of AQOs at all.

**Where are the failures in our policy process?**

**Reluctance to Adopt Stricter Guidelines**

− In mid-October, 2008, Chief Executive Donald Tsang announced in his policy address (in the policy agenda) that Hong Kong will adopt the WHO Interim Target Level 1 standard (IT1) – the weakest standard available. He announced this before the review was concluded. Scientists reacted negatively because IT 1 is used for extremely polluted, developing countries. Hong Kong, as a developed country, does not belong in this category.

− Government says that the new guidelines have to be achievable, and the WHO AQG is unattainable even in the long term.

− My own guess is that government officials are worried about looking bad if the standards are too tight and the number of exceedance-days are too large.

− In private, another official said that if the standards are too stringent, it will jeopardize their funding applications for pollution control. Our levels would be so high above the standards that it will appear as if any effort would be useless.

**A Lack of Accountability**

− Why doesn’t the government uphold the principle of protecting public health in the AQOs? Language about the public health link to air pollution is absent in our legislation.

− How is policy made? The government does not seem to pay much attention to scientists. Widespread sense of resignation that we live with a polluting neighbour and can’t do anything about it. My hope is that science will lead to meaningful action.

− The system lacks accountability. If government officials don’t take action, they don’t face any negative consequences. However, if they set too strict a target and fail to meet it, they will be blamed.
1(f) Dr John Froines – Fine Particulates (PM$_{2.5}$)

Early evidence for PM$_{2.5}$ health effects emerged in 1997 from studies such as the Harvard Six Cities Study and the American Cancer Society studies, which looked at respiratory hospitalizations, lung function and respiratory symptoms, school absences and lung cancer.

**Review of PM$_{2.5}$ literature**

- Short term exposure: An increase in 10 micrograms per cubic metre leads to 0.4% to 1.5% increase in risk for mortality.
- Long-term exposure: An increase in 10 micrograms per cubic metre leads to 6% to 17% increase in mortality risk.
- 0.6 to 1.8% increase in risk of cardiovascular mortality per 10 micrograms per cubic metre increase.

State of California did another review of mortality that led to revisions in earlier evidence:

- Risk increases were larger.
- Risks were seen at lower levels – no threshold.
- Annual premature deaths may increase from 14,000 to 24,000 in California.
- Benefit of attaining federal standards: avoid 5,500 premature deaths.
- Benefit of attaining state standards: avoid 9,300 premature deaths.
- Primary diesel attributed PM deaths in 2000: 3,900.
- We cannot make progress without dealing with the transportation issue. Particle sizes under 2.5 micrometres must be addressed.
- Health effects associated with traffic emissions at current levels, not past levels:
  - Central nervous system and autonomic nervous system,
  - Low birth weight and pre-term babies,
  - Increase in asthma and other respiratory disease,
  - Decrease in lung development in children,
  - Atherosclerosis (chronic inflammation of the arteries) exacerbation, and
  - Cancer,

**The next step in research should be:**

- Different time scales of exposure.
- Mechanistic pathways to harm.
- Significant role of vapour condensation and semi-volatile particles.
- Must focus more on vapour toxicity.
- Evidence of effects of fine particulates on mitochondria. Coarse particles are excluded from cells, but fine particles are absorbed into cells, and even into the mitochondria.

While PM$_{10}$ is still important, we must continue science and policy responses for PM$_{2.5}$.

This summary is based on presentations and participants’ comments from the Experts Symposium and does not necessarily represent the views of Civic Exchange, the Hong Kong Jockey Club, or participants’ organizations, nor a consensus of all participants.
1(g) Dr Quentin Chiotti – Risk Communication

The public must have credible information on the health effects of air pollution:

− The voice communicating must be perceived as credible.
− This can help us raise questions of risk assessment and how we can use community tools.

In Canada:

− We have very credible data.
− Pollution health effects are much lower than in Los Angeles.
− Canada has an active medical profession that promotes pollution reduction and public health:
  - They communicate with the health agencies, but it is critical to engage other sectors as well (environmental groups, industry partners and government departments to rewrite standards).
  - Civil society groups pushed the initial proposal that was eventually accepted by the government.

Problems in Canada:

− The oil sector and auto sector blame each other for air pollution, making it more difficult to enact change.
− Trans-boundary pollution: Ontario receives pollution from the United States, only 50% of PM episodes are from local sources

Taking Action

− Federal Government introduced national caps for emissions for various pollutants from 2006 levels that must be met by 2012-15. This also included industry-specific caps.
− Ontario decided that its old AQHI were misleading the public because 92% of health effects occurred during good or medium days.

− 6-year initiative to develop a new health-based air quality index. It is presented like the Ultra-Violet index on a scale of 1 to 10, labelling health risk as low, medium, or high.

Something like this would be very useful in Hong Kong for the public to self-calibrate their responses to health risks.

Caveats:

− There is no known threshold for pollution health effects, so some members are still at risk even if air pollution is low.
− It is not just the old and infirm who are at risk, but a broad section of the general public.
− The index is not:
  - A tool to assess the effectiveness of interventions/ policies to reduce emissions.
  - A trend indicator to determine air quality trends or to assess health risks.
  - All-inclusive (e.g. it excludes pollen, humidity, odours...).

This being said, it can be used to inform policy makers.
1(h) Question and Answer Session

Question: Can individuals protect themselves from exposure to air pollution?
Response: Broadly speaking, no.

There are a few examples where people may be able to protect themselves:

- As harm takes place through oxidant processes, a diet sufficient in anti-oxidants may somewhat reduce the effects of air pollution.
- Dosage is also important: exercising increases your dose of pollution. You could avoid exercise, but this seems counterproductive and is a significant restriction of your freedom.
- We need to have some concept of how air pollution causes symptoms in medical terms. We are not concerned about dropping dead within the next five minutes, but statistically there is an increase in mortality rates – most people in the scientific community understand air pollution from the perspective of it making you die sooner (of course, everyone dies eventually!).
- Individuals have both long-term and short-term vulnerability. Air pollution is an added factor in a situation when someone already has reduced resistance against illness due to other factors. Immunizing people (especially the elderly) against pneumonia, influenza, etc. will protect the population to some extent.

However, these are only secondary responses to dealing with the problem.

Question: Using machine air filters inside homes – Do they work, or are they counterproductive because of the electricity use?
Response:

- Need an engineer to tell you if it’s counterproductive, and indoor pollution is significant. However, in Los Angeles, there are no filters that are effective enough remove the ultra-fine particles to protect children. What level of filtration is adequate is an open question. Indoor and outdoor pollution are connected.
- You neutralize the effect of filters if you open a window.
- On filters generally: Combustion creates particles, but also vapours, which condense into semi-volatiles, which are much more toxic than the particles. It is an oversimplification of science to simply install particle filters. Reliance on filters will not address the problem adequately.

Question: Why focus on hospitalization rates – e.g. what about hidden effects – decreases in productivity, damage to the tourism industry, other effects lower down the ‘pyramid of harm’?
Response:

- We have a lot of evidence from short-term exposure studies of health effects lower down the pyramid, such as health symptoms and primary care usage (outpatient visits). Hong Kong and London have studies showing these effects.
- Studies tend to focus on mortality and hospitalization rates because that data is readily available. It’s more difficult to find data on GP consultations – gathering that data took three years in the Hong Kong study.
- We have economic effects studies that take into account the cost of a statistical life lost, the cost of hospitalization, and lost productivity (wages). We also have studies that take lifestyle into account. Exercise offers some protection, but a lot of vigorous exercise makes you more vulnerable. People with certain lifestyles are also more at risk (i.e. smokers, people with dietary problems). There is a relationship between air pollution and influenza, in that during flu season, infection rates go up when ozone levels are high. A reduction in pollution will reduce influenza infections.

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**Question:** To what extent should policy change come from public health instead of environmental departments?

**Response:**

- Currently there is no public health expertise in the Hong Kong Government influencing policy, and it's a huge obstacle.

- There is no strong input from the health sector in environmental policy in Hong Kong. Due to the peculiarity of Hong Kong's system, it is important to convince the people at the top. Health effects are shortening life spans, but the Chief Executive once said that Hong Kong has the longest life expectancy in the world, so air pollution is not a problem. Top people don't believe this issue is a priority.

- The approach in Europe has been to carry out integrated modelling which deals with not only health impacts but also with impacts (i.e. vegetation and crops). Complex integrated modelling explores different scenarios relating to pollutants and outcomes.

**1(i) General Comments**

**Air Pollution vs. Climate Change:**

- In Europe, there has been a push towards diesel engines because of climate change. Countries now have incentives in place for diesel engines because they produce less CO₂ per kilometre travelled. They have pretty good particle filters now, but they don't remove ultra-fine particles. This results in a Catch 22 situation. There's a compartmentalization of policy-making, where the global-warming people don’t communicate with the air-quality people.

- The shift towards diesel in London added 90 premature deaths per year. There are trade-offs between dealing with pollution and with global warming. We need to integrate the two issues and think of win-win situations, such as using less fuel and higher fuel efficiency.

**PM2.5 vs. Ultrafine Particulates:**

- When PM 2.5 emissions go down, the number of ultrafine particles actually goes up.

- Euro VI is attempting to deal with the particulates issue by regulating the number or particles. The higher number of particles, the greater chance is that some are ultrafine. They are aware of the problem, but it is uncertain whether they will be successful in addressing it.

**CAPES:** Prof. CHEN Bingheng, Fudan University, Shanghai introduced delegates to the China Air Pollution & Health Effects Study (CAPES). The Ministry of Environmental Protection has provided funds for a multi-city time-study on acute health effects. There are already nine major cities participating, mostly in the East and the Centre of the country (data from Western cities is not as available). The eventual aim is to update air quality standards in China. (Prof. Chen's slides are available from the Resources page of the Conference website).
SESSION 2 – ECONOMICS, LAW AND POLITICS IN AIR QUALITY POLICY

Moderated by: Prof. Bill Barron - Atmospheric, Marine and Coastal Environment (AMCE) Program, School of Science, HKUST.

Panel Members and Session Summary

Panellists’ presentations are available from the Resources page of the Conference website: http://air.dialogue.org.hk/web/eng/resources/top.html. More detailed notes on each panellist’s presentation are provided after the summary.

(a) Dr Terry Barker – Tyndall Centre for Climate Change Research, Cambridge University, UK:

The Economics of Managing Damaging Pollutants from Marine Sources: Aviation and shipping are by their nature global businesses that operate in the global legal environment and contribute to global pollution problems. It makes sense to include them in a global emissions trading scheme (GETS). Overall costs will be lowered by treating both together. GETS aims to manage both greenhouse gases and local pollution. The current focus on interventions to deal with the economic crisis presents a huge opportunity for the development of green technologies.

(b) Dr Alan Lloyd: President, International Council on Clean Transport (ICCT):

Lessons from Controlling Emissions from Transportation in California: Critical facets for the success of the California programme included: strong research programme; strong legislative support and leadership; active environmental groups; updated regulatory programme based on new research; regional management approach. Standards drive technology development and the standards must be based on public health considerations. Marine emissions become more important to address once other pollutant sources have been cleaned up.

(c) Dr Judy Chow - Atmospheric Sciences Division, Desert Research Institute, Nevada, USA:

Measurement Systems for Improved Air Quality Management: Air pollution standards need to be updated regularly because new technology will be held back by antiquated standards. Measurement systems provide the data to: quantify sources of air pollution and find risks; forecast future air quality; understand atmospheric processes; develop/test air quality models; identify and quantify source contributions; estimate immediate and long term hazards; maybe implement control measures; and evaluate the effectiveness of a control strategy, in the long run, by relating the strategy to effects on public health. Key challenges include: better collaboration on monitoring between different players; getting more timely data; and translating data into findings relevant to policymaking.

(d) Dr John Watson – Atmospheric Sciences Division, Desert Research Institute, Nevada, USA:

US Politics and Law as Drivers for Air Quality Management: We are not going to have air pollution control until people’s basic needs are met. Basing emissions reduction strategies on health-based ambient concentrations drove pollution control technology. The USA has had great success with single pollutant control strategies. But we need to look beyond that to secondary pollutants. Piecemeal development and lack of accountability have led to inefficiencies and avoidable legal actions. Science should inform the process. Pollution control is good for the economy. Gross National Product has increased as pollution controls progress. In the US, benefits have always exceeded the costs, and this is likely to be the case elsewhere.
(e) Mr Antonio da Roza – Barrister-at-law and Senior Research Assistant, Faculty of Law, HKU:

Air Pollution Control Legislation in Hong Kong: Current HK legislation – the Air Pollution Control Ordinance (APCO) – is very far behind international legal developments in air quality management. Most importantly, the connection between public health and air pollution is not consistent. Other internal inconsistencies and omissions include: No requirement to review; no external references (e.g. international standards); no clear consequence of breach of licence; emissions may be carried forward; fines not updated since 1993; no private right of action; tight time limit for prosecution; and it’s uncertain whether the ordinance has primacy over other laws.

(e) Prof. Michael DeGolyer – Director, Hong Kong Transition Project, HK Baptist University:

Survey of Public Opinion on Air Pollution and Environment, 2008: 20% of HK people are considering leaving HK due to air pollution concerns (about 1.4 million people). The percentage doubles amongst high-earners ($>70K) and highly qualified people (master’s degree). The medical sector shows the highest levels of concern. Most people talk with someone about air pollution but rarely to people in influential positions (media, government, or District Councillors). Workers in the public sector tend to be less concerned than other working people or non-working people. Compared with a 2001 survey, many more people are becoming more informed about air pollution and as they become informed they appreciate the complexity of the issues. Consistent with this is the finding that, compared with 2001, many more people think that the most important view that the Government should take account of when developing air quality policy is the views of independent environmental experts, or the opinion of the public.

(f) Question & Answer Session:

− Trends in illness and deaths vs. trends in air quality in Hong Kong?
Heart disease and respiratory illness trends are high and stable, with no significant downward trends. General air pollution trends are increasing, cool-season roadside RSP is increasing, and on current projections, even the downward trends will take many decades before they approach WHO levels.

− Why have emissions of SO\textsubscript{X} and NO\textsubscript{X} decreased in the US, while CO\textsubscript{2} emissions have increased?
CO\textsubscript{2} is not treated as a contaminant and therefore not subject to the same drivers for reduction.

− Private legal action and air pollution?
HK is a signatory to international treaties that state that the highest attainable standard of health is a human right. Enforcement of the treaties in relation to air quality hasn’t been tested. There has been a recent case where the Clean Air Foundation took the Government to court but the case was dismissed. Private rights of action may be an issue that ought to be dealt with by the current review of the AQOs.

− Links between air pollution and climate change?
There are interactions between air pollutants and climate change. e.g. black carbon. No laws in HK about climate change. We must develop ways that both defossilize and improve the global economy. Financial crisis represents a huge opportunity to focus investment on defossilizing HK’s economy.

(g) General comments

− Hong Kong has air quality ‘objectives’, not air quality standards.
– Standards drive technology.
– Environmental protection pays.
– Infrastructure decisions in HK are driven by considerations other than health and pollution.
– Several delegates made historical observations of London, Chinese industrial cities, Taipei, HK, and Guangdong.
2(a) Dr Terry Barker – The Economics of Managing Damaging Pollutants from Marine Sources

- Aviation and shipping (and transportation in general) are responsible for a substantial amount of pollution. By definition, these modes pollute where people actually live and work, leading to health impacts.

- International transportation has been growing in the sense of output, though there may be some slow-down because of the current economic depression.

- Aviation and shipping differ in nature. So why consider abatement for aviation and shipping together?
  - Because both are related to global problems. Emissions from US circle the globe and land in HK. Analysis of pollution in HK shows that it comes from all over the world.
  - Both modes pollute outside national borders, and face almost intractable difficulties due to the international nature of their business (e.g. international legal issues).
  - Overall, costs will be lowered by treating both together.

- Current institutions are not working: major attempts over the last few years to get a consensus between governments have failed. How do you tackle the global issue of pollution? A global emissions trading scheme (GETS).

- The aim of GETS is to ‘de-fossilize’ the world economy.

- Outcome – management of greenhouse gases and local pollution. Higher prices won’t necessarily stop growth.

- US policies are definitely focused on improving the environment as a solution to the economic problem. Use the development of green technology as a part of the solution to – huge opportunity.
2(b) Dr Alan Lloyd – Lessons from Controlling Emissions from Transportation in California

Critical facets for the success of the California programme:

− Strong research programme.
− Strong legislative support and leadership.
− Active environmental groups, armed with lawsuits.
− Updated regulatory programme based on new research.
− Air quality considered a regional issue, not a municipal one.

Key ingredients of regulatory program:

− Treat fuels and engine as a system.
− Standards drive technology development.
− Air Quality standards based on public health considerations, irrespective of fuel.

Marine emissions:

− Become more important to address once other pollutant sources have cleaned up.
− California interventions include: Main & auxiliary engines, and boiler rooms rules for reducing SO\textsubscript{X} and PM. Commercial harbour craft rule, shoreside power.

Conclusions:

− Public health continues to be the key driver.
− Technology-forcing standards have worked.
− Zero emissions should be the goal.
− Major progress has been made. And yet, California is still exceeding health based air quality standards for PM and O\textsubscript{3}.
2(c) Dr Judy Chow – Measurement Systems for Improved Air Quality Management

In the past 30 to 40 years, a lot of money has been spent on source and ambient compliance networks, driven by compliance with US NAAQS and EU guidelines, but these are antiquated. New technology was held back by old AQ standards.

Need better data to:
- Quantify sources of air pollution and find risks,
- Forecast future air quality,
- Understand atmospheric processes,
- Develop/test air quality models,
- Identify and quantify source contributions,
- Estimate immediate and long term hazards,
- Maybe implement control measures, and
- Evaluate the effectiveness of a control strategy, in the long run, by relating the strategy to effects on public health.

The challenges:
- Large investments have been made in networks equipment and expertise, but a lot of redundancies (e.g. set up at different times for different purposes) – the cost is a lot higher than people are willing to admit.
- Lack of collaboration – e.g. HK Observatory, EPD, and CLP all have facilities, but not being efficiently used.
- Influence of vendors keen to promote turnkey systems.

HK can be a worldwide leader:
- Expand measurement parameters for continuous instruments.
- Reduce averaging times for data reporting (from once a day to every 5 minutes or less) so we better understand in real time the relationships with nearby resources.
- Important to translate data into policy-relevant findings.
2(d) Dr John Watson – US Politics and Law as Drivers for Air Quality Management

- We are not going to have air pollution control until people's basic needs are met.
- People respond most strongly on air pollution issues to what they can see and smell.
- Basing emissions reduction strategies on health-based ambient concentrations drove pollution control technology.
- The USA has had great success with single pollutant control strategies. But we need to look beyond that to secondary pollutants.
- Piecemeal development and lack of accountability have led to inefficiencies and avoidable legal actions.
- Visual cues are the first step to pollution control, such as the impacts on highly valued treasured locations. e.g. Grand Canyon.
- Science should inform the process.

Costs & Benefits:
- Pollution control is good for the economy. Gross National Product has increased as pollution controls progress. In the US, benefits always exceed the costs, and this is likely to be the case elsewhere.

Future challenges:
- Simplify the rules and regulations. Streamline the types of AQ standards. Don’t have too many rules & regulations (now, it's an alphabet soup of different pollution control measures). Emission cap-and-trade schemes have been the more successful examples.
- Regulate pollutant combinations rather than individual pollutants.
- Have to redesign ambient networks to focus on problems of today, using the technology of tomorrow.
- Look at larger domains because pollutants come from other places beyond local areas.
2(e) Mr Antonio da Roza – Air Pollution Control Legislation in Hong Kong

- Current legislation – the *Air Pollution Control Ordinance* (APCO) – enacted in 1983 and was based on the *Clean Air Ordinance* of 1959, itself based on the UK’s *Clean Air Act* of 1956.
- HK is very far behind international legal developments in air quality management, even though the APCO has gone through a number of amendments.
- In the APCO, the connection between public health and air pollution is not consistent.

**Many internal inconsistencies and omissions:**
- No requirement to review the AQOs.
- No time limit and no incentive to update.
- No external references for objectives (e.g. international standards, cooperation with Mainland China)
- Air Pollution Abatement Notices: Confusing, because the notices don’t refer to AQOs.
- Emissions licenses may only be cancelled, varied or revoked with prior approval of Chief Executive.
- No clear consequence of breach. Licencees are insulated by the law.
- Emissions may be carried forward.
- Fines not updated since 1993.
- No private right of action: citizens can’t file lawsuits.
- No emergency powers. e.g. shut down schools if air quality too poor.
- Tight time limit for prosecution.
- APCO is additional to any other legislation, so it’s uncertain whether the ordinance has primacy over other laws.

- **HK as a preferred place to live**: 2% of respondents said they were planning to leave because of air pollution concerns. 6% are seriously considering leaving. In total, 20%, or about 1.4 million people are considering leaving.

- **Concern amongst skilled sector**: Amongst those respondents earning more than HK$70k a month, 40% are seriously considering leaving. 40% of those with a master's degree are considering leaving HK. The real costs of air pollution will be quite high.

- **Segment with highest level of concern**: medical sector. Clearly there are big public health problems if the physicians are the most worried.

- **Voicing concern**: only 1 in 4 never talked to anyone. But 95% never talked to media, government, or District Councillors. Why are so few people saying so little to decision makers?

- **Concern in the Working, Non-working, and Public sectors**: majority of first two groups are greatly concerned about pollution levels, but only 43% in the public sector are greatly concerned.

- **Informed community**: The striking feature about this survey is the dramatic reduction on ‘Don’t Know’ replies. This means HK people are now more interested in the issue and are informing themselves about it.

- **What should inform policy**: In 2001, most people felt Government should listen most to public opinion. In 2008, the public want Government to listen most to independent environmental experts. The public has realized the complexity of the problem. HK people are shrewd – they know when they have a problem, so it's time for the Government to catch up to the public.
2 (g) Question & Answer Session

**Question:** Can we clarify the various claims about trends in illness and deaths and trends in air quality in Hong Kong?

**Answer:**
- If you carry out a valid statistical analysis of pollution trends, taking account of year-on-year random variation, and taking account of the expanding aging population, then heart disease and respiratory illness trends are high and stable, with no significant downward trends.
- General and roadside air pollution trends are increasing and it would take many decades to reach WHO guidelines.
- When SO\(_x\) was restricted in HK fuels, HK experienced downward trends in mortality.

**Question:** Why have emissions of SO\(_x\) and NO\(_x\) decreased in the US, while CO\(_2\) emissions have increased?

**Answer:**
- CO\(_2\) is not treated as a contaminant and therefore not subject to the same drivers for reduction. In California, energy intensity is half that of the rest of the country. If CO\(_2\) were brought into the regime of costs, it’s likely that, as for air pollution, the benefits would exceed the cost.

**Question:** UN human rights covenants recognize that the highest attainable standard of health is a human right. Article 39 of the Basic Law imposes clear obligation on HK Government to enact these UN covenants. Could this be used as a basis for action?

**Answer:**
- A recent legal case went to court – *Clean Air Foundation vs. HK Government*. The judge was sympathetic but ultimately dismissed the case on the grounds that air pollution policy was not a matter for judicial review.
- If legislation provided the mechanism for people to take polluters to court, private legal actions may motivate change.
- No legal requirement for officials to engage in regional dialogue to solve air quality problems.
- Civil procedure rules will be changed in April, which will allow more NGOs to participate in lawsuits.

**Question:** Links between air pollution and climate change?

**Answer:**
- There are interactions between air pollutants and climate change. e.g. black carbon kills people from diesel particulates, and is a powerful radiative forcing substance when deposited on ice and snow (causes heat to be absorbed melting the snow/ice, rather than reflecting back into space).
- No laws in HK about climate change. Probably needs to be looked at in the near future when discussing how to improve the *Air Pollution Control Ordinance*.
- Over the past 10 years, the outdoor CO\(_2\) level at Victoria Harbour waterfront are rising at 4 parts per million (ppm) per year, or over 1% per year. In 2000: 360 ppm; today, near to 400; by end of this year, will exceed 400; a century ago, it was 240.
It may be ethically wrong to burn fossil fuels but it's impossible to come to or live in HK without burning fossil fuels. We must develop ways that both defossilize and improve the global economy, because we cannot stop using all fossil fuels if we wish to maintain society.

HK is a major world banking centre and in this financial crisis, the extent of bad investments has been revealed. But it represents a huge opportunity because Governments are concerned to see good investments. Why not consider major investment to defossilize HK's economy. E.g. say, require electric cars by 2020. China could develop its economy to become a major provider of electric cars.

2(h) General Comments

- **Objectives vs. Standards:** When it comes to dealing with air pollution in Hong Kong, we have 'objectives', not standards.
- **Standards drive technology:** Policymakers should not use existing technology to set standards. Set standards first, then do everything possible to attain them.
- **Environmental protection pays:** this is something that still is not accepted in HK, and not accepted in much of the Mainland outside the leadership in Beijing.
- **Flawed infrastructure policy:** The largest ongoing infrastructure project in HK is to extend the road system, which is likely to have negative effects on air quality. Infrastructure decisions are driven by considerations other than health and pollution.

**Historical observations:**

- **Air Pollution & Industrialization:** What were the most polluted cities a century ago? London and Detroit – the world’s industrial centres. What are the most polluted cities now? Chinese cities – the world’s industrial centres. Air pollution moves with industrialization. Ideally, the costs of air pollution should be borne by consumers of products.
- **HK vs Taipei:** 15 years ago, HK had much better air quality than Taipei. Today, Taipei is better than HK. Relevant in the discussion about where the 40% of highly qualified people might go to escape HK’s air pollution.
- **Cross-border interaction:** In Hong Kong in the 1990s, high sulphur fuel oil was banned. 50,000 factories moved to other parts of the PRD region, which coincided with Guangdong’s rise as a manufacturing centre.
SESSION 3 – FROM POLICY TO ACTION AND REVIEW - MAKING IT HAPPEN

Moderated by: Christine Loh, CEO, Civic Exchange.

Panel Members and Session Summary

Panellists’ presentations are available from the Resources page of the Conference website: [http://air.dialogue.org.hk/web/eng/resources/top.html](http://air.dialogue.org.hk/web/eng/resources/top.html) (Dr Hu Tao presented without powerpoint). More detailed notes on each panellist’s presentation are provided after the summary.

(a) Prof. Nuntavarn Vichit-Vadakan – Faculty of Public Health, Thammasat University, Thailand.

The Bangkok Experience: Thailand’s phasing out of leaded gasoline led to improvements in levels of PM$_{10}$. This success was possible because there was leadership from the top. Drivers for policy development for better air quality came from three sources: economics (policymakers), technical feasibility (government sector), and the effects on health (community).

(b) Prof. Zhu Tong – Professor, Peking University, Beijing.

The Beijing Olympics Experience: Air in Beijing over the last ten years has actually improved but pollution from vehicles remains a serious concern. For Beijing to effectively solve the problem, it had to co-operate with others in its region. Each of the surrounding areas had different pollution sources that had to be dealt with differently. The long-term benefits include: air quality improvement, increased public awareness, experience and confidence in the community and authorities that if they do something it can be improved, better infrastructure, a case for cost-benefit analysis, and a model for other cities in China for future events. Reasons for success: political will, systematic research, public concern and pressure in daily life/the Olympics, and favourable meteorological conditions.

(c) Dr Hu Tao – Ministry of Environmental Protection, Beijing.

Progress in Mainland China: We should control sources at the beginning of the pipe instead of the end as part of a “co-control” strategy. We should try to actively maximize benefits to eliminate everything at once in a co-control strategy that addresses both greenhouse gases and air pollutants. Chinese leadership understands that if we reduce emissions and greenhouse gases, this will lead to economic benefits. Even though there is no legally binding initiative in this area, we have still initiated a programme to improve. China currently has 6% renewable energy sources in its energy mix, and by 2020 its target is 20%. Collaboration with other countries would also be beneficial.

(d) Prof. Allen Zheng – Professor, South China University of Technology, Guangdong, China:

Progress in Emissions Inventories in the Pearl River Delta: Air pollutant emission inventories are fundamental for emission trend characterization, assessment of pollution control strategies, and emission budgeting for regulatory and compliance purposes. There are still many limitations that restrict our understanding, including a lack of localized emission factors, difficulties in data collection, high uncertainty in the accuracy of the data, and little work in the spatial, temporal allocation and chemical speciation. The latest data available from 2006 shows that power plants contribute about half of SO$_2$ emissions and 41.6% of NO$_x$ emissions. and industrial, mobile and power plant sources are major contributors of PM$_{10}$ and PM$_{2.5}$.
(e) Mr Anders Wijkman – Member of the European Parliament:

**Overview of European air policy over the last 40-50 years:** The main focus is public health. Emissions have gone down quite significantly, but the goal must be to lower emissions so they pose no significant impact on public health. Reaching these levels cannot be done effectively without tackling emissions from shipping and flights. Cross-border cooperation has shown to be very effective. First set standards and then use a whole series of policy instruments. Standards and targets also drive technology change. A systems approach is increasingly important. Policy areas must speak to each other to seek all possible synergies and lower costs. Ultimately we need to do away with our current transport systems and the urban planning that supports and caters to them. We also need better research to approach wider policy areas (e.g. consider climate change).

(f) Question & Answer Session:

- **How much sacrifice did European people make for changes in air quality?**
  
  In the long-term, it couldn’t be described as a sacrifice as the benefits outweigh the costs sometimes by as much as 10 to 1.

- **How can we use numbers to show there is a better path?**
  
  By using a co-benefits approach; by showing the GDP losses due to pollution; and by looking beyond GDP to other measures of performance that focus on ‘social’ rates of returns.

- **How will China roll out her leaders’ directives on sustainable development?**
  
  The top leaders want a transformation and are thinking long-term. Use the investment flowing from Governments as a result of the financial crisis to pursue a green economy. Make use of President Hu’s Scientific Development approach.

- **Who pays?**
  
  There are different people who pay the costs and different people who save. For instance the community pays for things like health. Polluters and payers need to be matched up. There is increasing understanding that the Global North needs to pay the way for the Global South to make the right kind of investments in terms of clean development.
3(a) Prof. Nuntavarn Vichit-Vadakan - The Bangkok Experience

Bangkok’s Success on Leaded Gasoline

- From 1980-1996, Thailand phased out leaded gasoline. This brought improvements in levels of PM$_{10}$, which peaked in 1996, but then decreased to under the prescribed standard in 2004.
- This success was possible because there was leadership from the top: the Bangkok mayor understood its importance (before he was the head of an environmental NGO).

Factors that Induce Change

- Drivers for policy development for better air quality can come from 3 sources: economics (policymakers), technical feasibility (government sector), and the effects on health (community). The importance of public health, however, is often seen as low priority.
- In Thailand, participation of the community in policy development is low relative to that of the policy sector or the Government.

3(b) Prof. Zhu Tong – The Beijing Olympics Experience

A Start in Air Quality Concern

- Concern of air quality in Beijing is relatively recent.
- Beijing started air quality measures in 1998, in 14 stages.
- Air in Beijing over the last ten years has actually improved (attainment days increased).

Challenges

- Even with any improvements, pollution from vehicles has become a serious concern. The numbers of vehicles on the road in Beijing has been fast increasing since 1990, reaching 4 million in 2006.
- Because Beijing is still an industrialized area, air pollution is amore difficult challenge to solve.

Main Findings for CAREBEIJING Study

- Observations were made with towers, aircraft, and by satellite.
- For Beijing to truly solve the problem, it had to cooperate with others in its region. Each of the surrounding areas had different pollution sources that had to be dealt with differently.
- Seven surrounding provinces were involved in an effort to improve air quality.
- Controlling VOC, SO$_2$ were particularly important.
Future Implications
- The long-term benefits include:
  o Air quality improvement,
  o Increased public awareness,
  o Experience and confidence in the community and authorities that if they do something it can be improved,
  o Better infrastructure,
  o A case for cost-benefit analysis, and
  o It can be a model for other cities in China for future events (Shanghai & World Expo, Guangdong & The Asian Games)
- Reasons for success:
  o Political will, systematic research, public concern and pressure in daily life/the Olympics, and favourable meteorological conditions all contributed to the success

3(c) Dr Hu Tao – Progress in Mainland China

Introduction: An Outdated Mentality
- In addition to cleaning up the energy, there should be reduction on energy use too.
- In the USA, power plants use FGD technology at the end of the pipe, rather than trying to solve the problems at the beginning of the pipe.
- Factors are missed. The USA has not treated CO₂ as a pollutant, thus its concentrations have been increasing.
- Power plants in Hong Kong use old technology.

China’s Perspective
- We should control sources at the beginning of the pipe instead of the end as part of a “co-control” strategy. Control strategies need to be made at the beginning stages not the later ones. Looking at the larger picture, we should try to actively maximize benefits to eliminate everything at once. It is not efficient to lessen the amount of NO₂, but as a by-product produce more CO₂.
- Chinese leadership understands that if we reduce emissions and greenhouse gases, this will lead to economic benefits. Even though there is no legally binding initiative in this area, we have still initiated a programme to improve.
- China currently has 6% renewable energy sources in its energy mix, and by 2020 its target is 20%.
- In the overall effort, collaboration with other countries would also be beneficial.
3(d) Dr Allen Zheng – Progress in Emissions Inventories in the Pearl River Delta

- The first inventory of emissions in the PRD was completed in 2004 for emissions in the year 1997.
- Air pollutant emission inventories are fundamental for emission trend characterization, assessment of pollution control strategies, and emission budgeting for regulatory and compliance purposes.
- Even with more studies in recent years, there are still many limitations. There is a lack of localized emission factors, difficulties in data collection, high uncertainty in the accuracy of the data, and little work in the spatial, temporal allocation and chemical speciation. This gap limits our understanding.
- The latest data available from 2006 shows that emission sources are power plants, industrial sources, mobile, VOC products, and biogenic sources:
  o Power plants contribute about half of SO\textsubscript{2} emissions and 41.6\% of NO\textsubscript{x} emissions.
  o Industrial, mobile and power plant sources are major contributors of PM\textsubscript{10} and PM\textsubscript{2.5}
- More work is needed to improve temporal and spatial allocations. An open data sharing policy among different parties will also be another important way to improve PRD regional emissions inventory.

3(e) Mr Anders Wijkman – European air policy in the last 40-50 years

Air Pollution in the Early Years of the Europe Union

- Last year Hong Kong had its worst air pollution year ever. It reminded me of Europe of 1950s, when The Great Smog of 1952 in London killed 10,000 people. This event led to action (i.e. do away with small coal furnaces).
- What started as a local problem soon became a regional problem as new tall-chimney power stations helped spread emissions across Europe and escalated the “acid rain crisis” which affected not only human health, but also the ecology (lakes, forests). Only when Sweden joined the EU did we have a more regional strategy to tackle issues like acid rain (lowering sulphur in fuels, stricter NO\textsubscript{x} limits for vehicles, gradual tightening of emission limits from large combustion plants).

How Europe Built a Solution

- Our strategy focused on restoring health to the ecosystem.
- Before, our legislation was fragmented, but now it is more focused. The main focus is public health. Another important pillar in crafting our legislation was to set standards and then to set measures so we can work hard to meet them.
- It also was important to be cost effective and holistic as possible in addressing pollution (including agriculture and trucks).
- Emissions have gone down quite significantly, but it is not enough. The goal must be to lower emissions so they pose no significant impact on public health. Reaching these levels cannot be done effectively without tackling emissions from shipping and flights. This makes it difficult because it then becomes international.

This summary is based on presentations and participants’ comments from the Experts Symposium and does not necessarily represent the views of Civic Exchange, the Hong Kong Jockey Club, or participants’ organizations, nor a consensus of all participants.
How Hong Kong Can Learn from Europe

- Cross border cooperation has shown to be very effective. Sweden has run into problems because each region is so different.

- First set standards and then use a whole series of policy instruments – no one solution will work – a combination approach is needed. Standards and targets also drive technology change.

- It is not a question of command-control vs. market approaches, the solution must be a mix. If you set standards for cities, government will take measures.

- A systems approach is increasingly important. Policy areas must come together because issues are not separate, they must speak to each other to seek all possible synergies and lower costs.

- The interface between science and technology is critical. Policymakers must be exposed to recent science.

- Technology is not enough though. Lifestyles, consumption and the type of national growth are very important. This is particularly true for transportation. Ultimately we need to do away with our current transport systems and the urban planning that supports and caters to them.

- We also need better research to approach wider policy areas (i.e. consider climate change because it relates to air pollution.)
3(f) Question & Answer Session

Question: How much sacrifice did European people make for changes in air quality?

Response:
- Even if you only consider public health, in every case the benefits exceed the costs. If you include other potential benefits (i.e. ecosystems, transport congestion), the benefits may outweigh the costs ten to one.
- Previously, models used the Equilibrium model that assumes full employment. The recent financial downturn actually favours a new type of model because full employment is no longer true. Economic, environmental and health benefits are far greater now, which supports the idea that urgent action to address air pollution is good.

Question: How can we use numbers to show there is a better path?

Response (including comments on the uses and limitations of GDP):
- There is chapter in the IPCC 4th Assessment that focuses on co-benefits, mitigation (transport, buildings) and illustrates how investments in different areas reap different benefits. What we need is to act on a larger scale and use all available tools (legal tools, market mechanisms, command and control). There should be no more need for debates and discussion. We need to roll out the plan now.
- We cannot only use GDP growth, as it is not the sole measure of progress. China has lost about 7% of its GDP growth because of pollution. If we look back to 1930s, the U.S. [who invented the measurement] said to not use it as a progress indicator. We need to develop a parallel proxy indicator. There are several progress indicators that have been developed during the past several years, none of which are perfect, but then GDP is not perfect either.
- China has looked into Green GDP, but technical problems stopped it from being used.
- GDP is not an illusionary marker; it has multiplier effects in jobs, asset values and consumption. A consumption built economy means that economic downturns changes people’s perception of well being because they are forced to consume less. We have to change our thinking from emphasizing “growth” to emphasizing “development.” We need to change the perception of what the economy is for and what constitutes real value.
- The concept of GDP was created in the US by President Roosevelt’s team during the Great Depression. It was a specific tool used for a specific purpose and a specific time.
- We can use co-benefits analysis. We need to go beyond just the GDP for our children and for our health. This ties in with the world economy, with bankers creating bad money over the past 20 years. We have a culture that focuses on private return. We need to think of social rates of return too.

Question: How will China roll out her leaders’ directives on sustainable development?

Response:
- Calculating Green GDP was very technical and we could not figure out how to do it properly in the end. There are micro issues involving the competitiveness of companies (push polluters to reduce pollution, attach certificates to the sale of cleaner products). The costs of greening will be short term, but business can improve in the long run. There are macro issues including policy recommendations to leaders to decrease specific pollutants such as sulphur and carbon. We calculate long-term benefits using modelling to formulate recommendations, as we believe this long-term approach is better for China. Something we could do is not save polluting companies in the downturn. The top leaders want a transformation.
- The financial crisis paradoxically has an upside: With factories slowing down, emissions are also down. Government is now more focused on employment. With money to invest, where will
the money go? Will it go to dirty companies? One place it can go is to greening the future. We need to convince government to look at other ways to develop that includes less polluting industries. The issue right now we still lack a plan. We are arguing when we should be seeing how to create a better environment.

- President Hu’s Scientific Development approach shows a shift towards social welfare. Have to rethink this GDP concept. This different way of thinking about development can be applied in policy areas (freshwater, dangers of over fishing).

**Question:** Who pays?

**Response:**

- There are different people who pay the costs and different people who reap the benefits. For instance the community pays for things like health. Polluters and payers need to be matched up. In Denmark more profit taxes are being transferred to pollution taxes. Government can play a role in determining this structure.

- The North-South discussion is currently a feature of the OECD climate change dialogue. There is increasing understanding that the Global North needs to assist the Global South to make the right kind of investments in terms of clean development.
SESSION 4 – SUMMARY OF SMALL GROUP DISCUSSION – “MAKING IT HAPPEN IN HONG KONG”

Introduction: After the three panel sessions, delegates were invited to cluster in smaller groups (about 10 people each) for more detailed discussion. The small groups were given two focus questions:

- “Having heard the experiences and successes from other jurisdictions, what is relevant to Hong Kong?” and
- “How do we make improved air quality happen in Hong Kong?”

After the small group discussions, each group reported highlights of the discussion to a plenary session.

The discussion in the small groups and plenary session were recorded by note-takers. The discussion was wide-ranging and not easily categorized under the two focus questions. Instead, the discussion points have been summarized below, under six headings:

(a) Articulating the problem of air pollution in Hong Kong,
(b) Challenges and barriers to progress in Hong Kong,
(c) What we need for better air quality,
(d) Solutions, and
(e) Opportunities, and
(f) Summary of Report to Plenary

4(a) Articulating the Problem

Multiple sources and effects on health:

- The major source of pollutants by volume is from the power sector, but it is not power plant emissions that most directly affect human health. People don’t blame the power sector for deteriorating public health.
- People spend a lot of time on the street so are exposed to more risks in terms of roadside pollutants from transport sources. So controlling roadside air pollution is important in terms of public health.
- There seems to be a linear correlation between pollutants and health effects down to very low numbers. Is there a tipping point somewhere that would cause drastic deterioration? That’s not clear.
- 80% of the particulates come from diesel trucks and vans.
- Why did taking sulphur out of fuel produce such large health gains in 1990? Only SO$_2$ levels changed. Mass concentration of particulate matter didn’t change. What did change was the nature of the particles, their chemical composition.
‘Total volume’ approach is flawed:

- The Government is focusing on NO\textsubscript{x} and SO\textsubscript{2} instead of particulates even though particulates have the biggest impact on health. The bureaucrats are focusing on the former because they’re the biggest emissions volume-wise, and it’s an obvious problem that is easily improved. They’re focusing on making pie charts.
- SO\textsubscript{2} is a large pollutant by volume. PM is small. The bureaucrats always hit the big target first.
- When taking control of pollution, a multi-objective approach is crucial, while here in HK we don’t have it.

Economic issues:

- The public opinion survey backs up academic health studies. People feel the health effects themselves. How do we channel this to business and the media? Our policy-making mechanisms are no longer functioning: the solution for wealthy people is to move away. This hurts our economic competitiveness.
- The Government doesn’t buy the economic argument. They don’t understand the economic benefits of an environmental policy. The Chief Executive thinks if he takes action on air, he’ll be hurting business. It’s a misconception.

Mismatch of concern:

- It’s a big problem for your basic needs if you keep getting sick from air pollution, but the Government says, ‘We have the longest life expectancy in the world’.
- The general public regard air quality as a problem. However, public sector workers who show less interest.
- Civil servants don’t realize the importance of air pollution. Why isn’t the civil service more concerned?

The Expat misconception:

- The perception that pollution is an expat issue is wrong. Expats make up 3% of the population. in the public opinion survey most of the concerned people were locals.
- Cleaning Hong Kong’s air is not an issue driven by foreigners living in Hong Kong. The effects of bad air affect locals. Local children are suffering the adverse health effects of bad air.
- The government thinks that pollution is an expat problem, but having to take a sick day off is much more impactful for a low-income family.

On whom do the health impacts fall hardest?

- The impact on children and elderly parents is especially strong. However, the burden on the ‘sandwich generation’ [the generation between very old and very young] is high. People are being squeezed in all directions: their wages aren’t rising, and they have to pay more for education, health care, and care for the elderly.
- Everyone is affected by air pollution, not just the wealthy or expats. The health impacts are a bigger problem for low-income families if they must miss days of work.
- There is a huge wage gap in Hong Kong. We have a brutal social system. Old people have little to retire on, there’s little social welfare. Maybe for the average person, pollution isn’t a big problem compared to putting food on the table.

Policy review is flawed:

- Recently there was a HK$ 3 billion scheme to incentivize the replacement of pre-Euro standard trucks, but the execution was terrible. There was only 10% take-up in the first year because there was no stick and the carrot was too small. They’ve now extended the time frame but without changing their incentive strategy.

Making the case to Government:
− We haven’t persuaded the Government on this fundamental question – why is pollution management relevant to HK? From the Government’s point of view, a relatively small percentage (~10%) comes from local pollution sources and trends aren’t dramatic - if government is to adopt policies for controlling pollution they must be convinced that the emissions trends that are getting rising. And yet, even if it’s true that some pollutions trends appear to decrease, the health effect is the opposite. And traffic volumes are increasing.

− There needs to be a clear case for the Government to act.

− Does the scientific community have influence on the Government in Hong Kong? C.f. other jurisdictions.

− Discussing air quality in terms of public health is helpful as it lends the issue relevance and imperativeness

Exacerbating factors:

− It is clear from international studies on mortality that the concentration of humans (population density) is very important. If people are densely packed, health effects are worse than if people are spread out.

− It’s impossible to look at air quality without including indoor air quality and tobacco.
4(b) Challenges & Barriers

**Inadequate role for science in setting policy:**
- In the Mainland, the government takes advice from science researchers and even political researchers on environmental issues. But the HK government creates the agenda and the ‘answer’ first, then does research to support the pre-determined outcome.
- In Mainland China, the scientific community plays a role in educating the government.
- The government does not listen to science, and therefore gets bad advice. It should create a master plan, using science.
- Government makes policies without input from science, especially when it comes to public health.

**Institutionalized inertia:**
- Policymakers and regulators are afraid of mistakes, so they always go back to the pre-existing ideas.
- There are no obligations for the HK Government to change.
- Government is afraid to draw attention to the issue.

**Lack of leadership and political will:**
- From the Beijing and EU examples, we know that a crucial and fundamental driver of change is government intent. This is lacking in Hong Kong.
- We don’t have the government leadership. Government won’t admit that there is any problem. This gives the public the impression that air quality is fine.
- Hong Kong needs greater leadership. The [National] Chinese government understands external costs; the HK government doesn’t. Mainland has the leadership that HK lacks. HK leadership is too cautious; very risk adverse.

**Concentrated decision-making centres:**
- In Hong Kong, decision-making power is concentrated between the offices of the Chief Executive and Chief Secretary. It is not sufficient to only convince lower level political actors of the seriousness of the problem.
- The Chief Executive is very business friendly.

**Political system:**
- A major issue is that people can’t vote out those in charge. Given the obvious visual evidence of air pollution and health effects, there would be huge amount of political pressure in places like the US. Why is there so little in Hong Kong?
- In the US, it’s a democratic political system. In HK, it’s a top-down system, so it lacks links among people. There should be more communication.
- For the time being, we have to accept that the system of government as it exists now. For a change in leadership in Hong Kong, it’s necessary to change the system of selecting the Chief Executive. Hong Kong will have the same leadership until 2017.
- The way we elect the Chief Executive creates the situation where the candidates have to get support by the business sector.

**No whole-of-government approach:**
- Silo mentality amongst the Government departments.
− The EPD and the Health Department have nothing to do with each other. The Health Department doesn’t set health standards.

− The Environmental Protection Department (EPD) does not consider health effects. It has no mandate to handle health, and doesn’t have the expertise. The EPD must be convinced to measure health.

− There should be synergies amongst departments. e.g. planning department, transport department, etc.

**Hong Kong attitudes:**

− Hong Kong people do not like to speak out.

− HK people are not the same as people in the Mainland because we are mobile. If we don’t like it, we can move to somewhere else.

**Lack of knowledge, understanding and awareness:**

− The time-based study actually showed that 53% of the time, we are dealing with primarily local sources from roadside emissions and ships in the harbour. The previous Environment Secretary, Sarah Liao, said that 80% of our pollution comes from China so we can’t do anything. Everyone is still stuck on that number.

− Hong Kong people don’t understand air pollution very well.

− Hong Kong people are aware of the problem but they are not clear about the economic gains if they do something.

− Government believes that it’s not a cost-benefit issue.

**Blaming Guangdong:**

− By volume, 90% of HK air pollution is from PRD, while locally is 10%. HK Government is arguing that the pollutant sources are mainly from mainland not HK, so the Government always has an excuse.

− HK is not co-operating effectively with the Mainland.

**Diffuse nature of Hong Kong’s air pollution:**

− When there are short-term extreme levels of pollution, there will be a lot of acute damage (like the London Smog of 1952 which killed 12,000 people). That’s not what we have in Hong Kong.

**Policy mismatch:**

− Unfortunately, energy policy isn’t addressed from health/environmental point of view in Hong Kong.

− The way we finance rail here is through real estate. It’s more difficult to pay for a freight line because there would be no passengers or real estate development potential.

**Technical challenges:**

− Hong Kong trucks travelling to the Mainland use catalytic converters to reduce emissions, but dirtier Chinese fuels damage them.

**Vested interests:**

− 80% of the particulates come from diesel trucks and vans. Truckers are individual owner-operators with a lot of political power because government is afraid of them blockading the city.

− Transportation is a problem in HK but government is not dealing with it.

**4(c) Needs - What Needs To Be done?**

**A multifaceted approach:**

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This summary is based on presentations and participants’ comments from the Experts Symposium and does not necessarily represent the views of Civic Exchange, the Hong Kong Jockey Club, or participants’ organizations, nor a consensus of all participants.
There are layers of air quality control. In North America there are bilateral agreements between Canada & the US. Local initiatives are important – we must clean up our own backyard. It’s also vital to have a multi-pronged approach.

According to EPD’s data, 3% of the emissions are from marine sector, concentrated in west-Kowloon. The key point is the pollution in shipping is more toxic than in road transport in terms of pollution exposure. More examination of the target groups that are exposed to particular air pollutants in certain region is necessary. And government should to apply the policy on this level.

Long-term planning:

- Need to prioritize and determine where is the big bang for the buck? Policy takes 3+ years to implement – in North America, the focus was on lead reduction, then sulphur, now cleaning coal plants.
- We should have more cross-border and inter-government exchange.
- We should have a climate action plan.

Legal:

- We need a legal framework to force the government to address the health impacts of air pollution.
- Government should re-evaluate the legislation in a scientific way. There should be a time limit/agenda to re-evaluate policies.

Inter-governmental exchange:

- The solution has to be regional in scope for it to be effective. Cooperation in the Pearl River Delta could be modelled after established regional environmental initiatives such as the Commission for Environmental Cooperation (CEC) and the EU’s environment program.
- Must develop the relationship with Mainland China. Hong Kong could be a great model city for Mainland China.

Research & education:

- We should generate the next generation of thinkers. Get the universities to fuse majors so the students can understand more general issues.
- Emphasize the evidence of the health effects of air pollution to government, including comparative risk assessments on the health impacts of various risk factors, such as food contamination and water pollution.
- Air pollution isn’t the public’s top concern in Michael DeGolyer’s survey. It might be useful to consider comparative risk assessment. Use a comparable set of methods to measure the health impact of different problems – water quality, air quality, food safety, etc. Air pollution will probably have the worst impact, objectively. The World Health Organization is doing a comparative risk assessment on a range of potential modifiable risk factors where at the end of the day, you can rank the impacts to some extent. Asia was the one place where air pollution carried substantial risk for disease. You need to compare the impact of air pollution to the other things to underscore its importance.
- To get a better handle on the local/regional issue, track local annual emissions during the last 10 years against ambient pollution levels, and if local emissions have stabilized but overall pollution has increased, then the increase should be attributable to cross-boundary pollution.
- The health impact data had a major effect on policy in Europe. When an estimated 375,000 people die prematurely per year, the argument bites.
- We need to show strong evidence that hospital visits increase with high air pollution.
- We need more forums like this.
Inter-departmental co-ordination:
- The Government should raise the profile of the health department in order to coordinate with other departments e.g. water, food, traffic, etc. in order to reduce silo-style thinking about issues.
- Health and environmental policy need to be integrated.

Better communication:
- It is vital to explain the short-term costs, but also to highlight the long-term benefits.
- Though the science is complicated its important to do something that is tangible. If the critical pollution comes from the road, let’s get this message across to the public by adopting sensible policies to make people look at this subject.
- We need to find new ways to present public health info to the government and the public, especially getting it into Chinese language press.
- We need to empower people to voice their views to policy-makers. Besides protests, the media is a useful means of activating and representing public opinion. However, the media is currently not paying enough attention to the issue of air quality, especially the Chinese press that reach the bulk of the population. To bring citizens’ attention to the problem, there needs to be more effective communication of air pollution levels and how it affects the man on the street.
- We need to put the Hedley Environmental Index on front page of newspapers every day.
- Emphasize the economic benefits of tackling pollution. There is a misperception that dealing with pollution would be bad for business and the economy.

Changing policy:
- Policy-makers need to come up with a broad, forward-looking vision first, before drawing out practical steps.
- Past incidents have shown that change can be brought about from the bottom up. the Hong Kong people managed to push the government to action before (e.g. protests against the Security Bill, Article 23). Thus, a show of public concern might lead to greater action from the Government.
- It might be difficult to convince all of the general public, hence we need opinion leaders to help disseminate the information and persuade the public.
- Will the ‘Hong Kong’s Silent Epidemic’ public opinion survey convince the government to step up efforts to control air quality? Not likely, because unless the problem has tangible, serious consequences (e.g. deaths, as in the SARS episode), the government will not pay attention. Threats of brain drain will also not likely work as the government thinks: even if some businesses and talent don’t choose to locate in Hong Kong, others will.
- Must look at integration, cooperation, accountability, and collaboration to get public health on the agenda in discussions of air quality.
- Must pick spots to focus efforts. Hong Kong leadership is threatened by media and very concerned about how Hong Kong’s image is viewed internationally.
- Currently, Hong Kong only has air quality objectives, no standards. Could it be possible for Hong Kong to adopt WHO international standards? Not likely. It would be more feasible for the government to create its own innovative criteria or set standards that are in between the current and WHO standards.
- If the EU uses health impacts as a measure, then we should show that to Hong Kong’s bureaucrats. Hong Kong doesn’t do anything that everyone else isn’t already doing.
4(d) Solutions

- Long-term solution: Defossilize the Mainland economy.

Expressing public concern:

- Thousands of people must not know that the AQO review is ongoing. Email everyone at the conference and give them simple instructions.
- The public must speak up more: encourage letter-writing campaigns to make government aware that people are concerned. Focus letters on current AQO review.
- The Government responds to community pressure, as seen with the old-age allowance policy events recently – the Government radically changed their policy in the face of this pressure.
- Use the media to pressure government to improve air quality. Governments hate bad press.
- Use community pressure, public opinion and the media to pressure the government improve air quality, with a focus on public health.
- Petitions could be organized to show public support. In the Philippines, petitions have helped pressure the Government to clean air more quickly.

Energy efficiency:

- 2/3 of our energy here is spent on air-conditioning. Energy-efficient buildings are an obvious solution.
- Energy efficiency measures are an obvious win-win-win solution for Hong Kong – easy to implement by offering discounts on government rates, and will reduce energy use, carbon dioxide emissions, pollutants, and create jobs.
- Make a rule that air-conditioning can’t be set below 24 °C. Air-cons run too strong, and most of it is dissipated. In Beijing and Shanghai, meeting rooms are set at 24 °C but here they’re always freezing. Make it an administrative order in government buildings, since they’re the largest employer.

Transport:

- Discourage the use of cars by making it more expensive to own and use cars through measures such as reducing parking spaces in Central and other congested areas.
- Encourage the use of public transport – make public transport free on high air pollution days
- Phase in electric cars in Hong Kong.

4(e) Opportunities

Using the economic crisis as a catalyst for creating a greener economy:

- The Government aims to spend its way out of the financial crisis. Building more infrastructure may be counterproductive. Instead, invest in R&D, green technology & transport. Use current reserves to improve environment.
- Hong Kong owners of factories on the Mainland have asked the government for financial assistance to weather the economic crisis. The government should be more selective and careful, for example the factory must commit to greener operation before receiving funding. Why postpone the death of bad/dirty factories?
− Take this time of economic crisis to develop green technologies and initiatives to improve air quality. Spend public funds on this, rather than other infrastructure projects such as roads and bridges.

**Hong Kong’s advantages:**

− Hong Kong is a high-density city, and other high-density cities have looked to HK for transport arrangements. Mainland Chinese cities are studying HK as an example of how to improve air quality.

− Hong Kong could be a model city for the rest of China, especially the megacities. Needs strong leadership to implement bold emissions control initiatives.

**Increased awareness and understanding in the community:**

− The public opinion survey asked people where they thought pollution came from, and the largest group of people responded 50:50 from the Mainland and Hong Kong. The second largest group thought it was 60:40. People have got it about right.

**Local initiatives:**

− Hong Kong can do much on its own by: reducing power emissions, desulphurization, increasing energy efficiency, improving rail infrastructure and stop building roads. Street-level emissions are high, and often increase. Hong Kong should be a global leader on improving air quality. It’s a very wealthy city. The Government is unwilling to learn what experts have to teach.

− Although requiring cleaner heavy-duty vehicles in California directly affected a small percentage of the population, the implementation of this has had a huge effect on attitude. Emissions travelling from elsewhere would have to comply and would have knock-on effect.

**Regional initiatives:**

− Will local legislation have an impact? In the US local initiatives haven’t been as successful as those that look at pollution basins as a whole.

**Concern from Beijing:**

− There has been a sea-change in China’s national administration. Can the influence on Hong Kong’s Government come from Mainland China instead of HK getting the PRD on board?

− Beijing has begun to signal to Hong Kong how to manage certain issues.

**Risk communications:**

− There are studies that have been done here linking visual perceptions to excess mortality. Visibility and health are linked.

### 4(f) Summary of the Plenary Session

**Integrating Hong Kong’s approach with the Mainland:**

1. Hong Kong has the opportunity to be a model. Hong Kong can set a good example for China and show them a good example of how a Chinese city deals with air quality issues.

2. Hong Kong needs to better connect with PRC. Chinese leaders have better vision than local leaders.

3. It may be a good time now to restructure Guangdong manufacturing in the wake of the financial downturn by providing loan guarantees, but with stipulations that they must improve their economic performance.
Hong Kong Government and Leadership:

4. Hong Kong needs better leadership on air quality. The general public and media have already given the vision; leaders must now lead.

5. The HKSAR Government is neither leading nor sending out the right message to the HK people. Hong Kong can still materially lower air pollution and improve local sources in a way that is not as expensive.

6. HKSAR Government should set action plans with targets and timeline.

7. Different government departments need to work together and have synergy. It is important not to act as a silo.

8. There needs to be better risk analysis.

Policy-related:

9. Hong Kong needs to conduct regular reviews of policy and must make it statutory to have accountability.

10. Adopt WHO standards as the public is misled by Hong Kong’s current objectives.

11. Marine emissions should be addressed. Differentiation of harbour charges is needed to account for dirty fuels, regulate sulphur content, electricity for ferries while they are idle.

Attitudes and behaviours:

12. Hong Kong needs to counter the message that it is not cost-effective to solve the problem.

13. Hong Kong can do a lot more in view of local sources of air pollution (need to re-think the idea of local vs. regional).

14. The public should channel views via the media.

15. Education of the next generation must begin now.

16. The HEI should be published in the newspapers every day.

17. There needs to be more efficient use of fossil fuels.

18. The Hong Kong public should push the HKSAR Government to take actions. External pressure may even be needed.

Research and analysis:

19. Hong Kong needs more scientific explanation about local sources to get across the message that even small amounts of pollutants affect public health.

20. There needs to be an analysis of the negative impacts of air pollution on Hong Kong from a purely economic standpoint. [The high density of HK population makes pollution hurt more].
APPENDIX 1 – ATTENDANCE LIST – EXPERTS SYMPOSIUM

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APPENDIX 2 – EXPERTS’ BIOGRAPHIES

(in alphabetic order):

* = speaker, moderator, or panellist at Expert Symposium, 9 January.
† = speaker, moderator, or panellist at public conference 10 January.
Others are expert participants and resource people for both days.

*† Prof. Ross ANDERSON is Professor of Epidemiology at St George’s, University of London, and is an internationally respected expert on the public health consequences of air pollution. Prof. Anderson has held a number of high profile community health positions both in the UK and internationally. He was a member of the World Health Organization (WHO) Steering Committee for the Revision of Air Quality Guidelines 2004–2006, the WHO Task Force on Health Aspects of Long-range Transboundary Air Pollution and the WHO Scientific Advisory Committee on the Health Effects of Air Pollution in Europe 2003–2004. He has been a long-time collaborator with other air quality research institutions in the UK, USA, Greece, Rome and Hong Kong.

*Dr Terry BARKER is Director of the Cambridge Centre for Climate Change Mitigation Research (4CMR), Department of Land Economy, University of Cambridge, Leader of the Tyndall Centre’s Integrated Modelling programme of research and Chairman of Cambridge Econometrics. Dr Barker was a Coordinating Lead Author in the IPCC Fourth Assessment Report (2007) for the chapter on mitigation from a cross-sectoral perspective, covering the macroeconomic costs of mitigation at national, regional and global levels in the short and medium term (to 2030). Research interests are in greenhouse gas mitigation policy, large-scale computable energy-environment-economy and world energy modelling.

*Prof. Bill BARRON is a long term Visiting Scholar with the Institute for The Environment of the Hong Kong University of Science & Technology and a Senior Research Fellow with Civic Exchange. He received his Ph.D. from the Johns Hopkins University. His work for nearly 20 years in Hong Kong has focused on environmental policy assessments, particularly with respect to transport and air quality. His current work includes trying to communicate more effectively to policy makers and the public an intuitive understanding of the challenges of sustainable development and how different types of responses fit into larger solutions.

Prof. Don BLAKE is Professor of Atmospheric Chemistry at the University of California, Irvine, USA. His research includes studies of energy use, principally fossil fuel combustion in various Chinese cities and rural areas, in order to better construct emission inventories used in chemical models of atmosphere.

Prof. Bingheng CHEN is Professor at the School of Public Health, at Fudan University, Shanghai and has worked in a number of high-profile capacities for the Shanghai Medical University, World Health Organization, Harvard University, and the Chinese Association of Preventive Medicine. Her major areas of research include air pollution and human health (HEI PAPA project, China CAPES project), health-based risk assessment and chemical safety, and standard setting on a series of environmental chemicals. Prof. Chen gives lectures on environmental health both in China and internationally and has written and contributed to numerous scientific papers and books. Currently, she sits on several important committees including the Olympic Games Air Quality Expert Panel and the WHO Steering Committee on WHO Air Quality Guidelines. Email: bhchen@shmu.edu.cn

*† Dr Quentin CHIOTTI is the Climate Change Programme Director and Senior Scientist at Pollution Probe, a non-government, research, education, and advocacy organization in Canada. He has published numerous articles in scholarly journals and books, and has taught at various universities across Canada. He is a member of several important environment-related advisory boards and committees in Canada.

*† Dr Judith CHOW, Nazir and Mary Ansari Chair Research Professor in Entrepreneurialism and Science in the Division of Atmospheric Sciences at the Desert Research Institute (DRI) in Nevada USA, has over 30 years of experience in atmospheric, air quality, and environmental health research and education. Dr. Chow is the principal author or co-author of hundreds of scholarly papers, book

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chapters, presentations, and technical reports. Dr. Chow is fluent in spoken and written Mandarin Chinese and English and has been principal investigator or a major collaborator in more than 50 large atmospheric studies in California and China.

*† Dr Aaron COHEN is Principal Scientist at the Health Effects Institute (HEI), Boston, USA. He manages an international programme of epidemiologic research on the health effects of air pollution, and lectures in environmental epidemiology at Boston University. He is a consultant to the World Health Organization (WHO), and was closely involved in estimating the global burden of disease due to outdoor air pollution for the WHO.

*† Mr Antonio DA ROZA is a Barrister-at-law, AM HKIArb, Senior Research Assistant for the Asian Institute of International Financial Law and the Centre for Comparative and Public Law, HKU.

*† Prof. Michael DEGOLYER is a Professor at the Department of Government and International Studies, Hong Kong Baptist University, lecturing in Statistical and Survey Methods for Political Science, Introduction to Political Economy, Contemporary Europe and Asia, and World Order Issues. His major research interests include comparative/historical political development and political economy; Hong Kong political development; technology and learning. He is the Director of the Hong Kong Transition Project.

*Dr John FROINES is the Director of the UCLA Center for Occupational and Environmental Health. His air pollution-related research includes the health effects of particulate matter and vapour phase co-pollutants in the ambient environment, mechanisms of action of toxicants, chemical toxicology, health effects attributable to air pollution. He directs the Southern California Particle Center, a major research centre devoted to studying the effects of particulate matter on human health. Dr. Froines serves on three committees of the South Coast Air Quality Management District. He has been Chair of California’s Scientific Review Panel since 1997.

*† Prof. Tony HEDLEY has been Chair Professor of Community Medicine at the School of Public Health, University of Hong Kong since 1988. Professor Hedley trained in the medical schools of Aberdeen and Edinburgh universities. His main research and public health advocacy interests in recent years have been in the field of environmental health, including outdoor and indoor air pollution.

*Dr. HU Tao is Senior Environmental Economist of the Policy Research Center, Ministry of Environmental Protection (MEP) of China. He is also the Chief Expert of the Trade and Environment Expert Group for the WTO New Round Negotiation for the MEP. He is also the member of UN Steering Committee of Sustainable Production and Consumption and provides environmental policy consulting services for World Bank, Asian Development Bank and the Global Environmental Facility. Dr. Hu also serves as Visiting Professor for the Chinese Flagship programme at the University of Oregon, USA. His research topics cover environmental economics, policies and governance, environmental and natural resources economics, globalization, trade and environment issue, and climate change issue.

*† Prof. Alexis LAU Kai-Hon is Director of the Environmental Central Facility, at the Hong Kong University of Science & Technology. His main research interests include atmospheric data analysis, numerical modelling of the atmosphere, regional and urban air pollution, and environmental education. He has published widely in international journals of atmospheric and environmental science.

† Mr Edwin LAU is the Director of Friends of the Earth (HK) and has been working on environmental issues in particular on waste and air pollution issues for almost 20 years. Mr Lau initiated the first waste paper recycling programme for schools and developed Hong Kong’s first “Sort & Recycle” system for public housing estate. In 1997, he launched the “Stop Idling Engines Campaign” to lobby the government to tackle air pollution problems. In 2000, he initiated the first Solar Cart Race in Hong Kong to promote renewable energy. In recent years, he has encouraged the community to conserve energy to address both local air pollution and global climate change problems. He gives talks regularly to various sectors of the community to raise their environmental awareness and encourage them to take action to make a difference. He is a member of the Advisory Council on the Environment.

Prof. Frank S. C. LEE is Professor and Air-Lab-In-Charge in the Department of Civil and Structural Engineering at the Hong Kong Polytechnic University. He received his Ph.D. in 1994 from University of Berkeley and was the founding Section Chair of the Air and Waste Management Association, Hong Kong Section in 1996. Prof. Lee has carried out several air quality studies in HK is an Advisory Panel

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Member of the review of Air Quality Objectives (AQO) commissioned by Hong Kong’s Environmental Protection Department.

**Prof. Shaw Chen LIU**, Distinguished Research Fellow and Director of the Research Center for Environment Changes at Academia Sinica, Taiwan, contributed to the scientific and technical reports that earned the Intergovernmental Panel on Climate Change (IPCC), the 2007 Nobel Peace Prize shared with Al Gore. Since 2004, he has collaborated with colleagues from Pearl River Delta (PRD), Hong Kong, and a research group organized by Peking University to carry out air pollution experiments in PRD.

**† Dr Alan LLOYD** is a founding member and currently President of the International Council on Clean Transportation (ICCT). He has served in several important government and research capacities, including Secretary of the California Environmental Protection Agency, where he led Governor Arnold Schwarzenegger’s Climate Action Team and was Chairman of the influential California Air Resources Board (CARB).

**† Ms Christine LOH**, OBE, is the co-founder and Chief Executive Officer of Civic Exchange. Prior to this, she was a member of Hong Kong’s Legislative Council from 1992 to 1997 and 1998 to 2000. Today, she is an International Advisor to the G8 + 5 Climate Change Dialogue, Senior Policy Advisor to the C40 Cities Climate Change Leadership Group (London) and an elected Director of the Hong Kong Exchanges and Clearing Ltd. In October 2007, she was recognized as one of the “Heroes of the Environment” by TIME magazine.

**† Prof. Sarah MCGHEE** is Professor at the Department of Community Medicine, School of Public Health, University of Hong Kong. Her current research covers aspects of health economics including costing of the impacts of air pollution and tobacco, assessment of quality of life and cost-effectiveness of childhood vaccines.

**Mr Simon K. W. NG** is a Visiting Scholar at the Institute for the Environment, Hong Kong University of Science & Technology. He received his training as a geographer at the University of Hong Kong and the University of Cambridge, UK. Simon’s research interests include transport policy and planning, rail and seaport development, environmentally sustainable transport, and air quality management. Simon is a Chartered Member of the Chartered Institute of Logistics and Transport in Hong Kong.

**† Prof. Nuntavarn VICHIT-VADAKAN** is Associate Professor and Dean of Environmental Health and Epidemiology at the Faculty of Public Health Thammasat University, Rangsit, Thailand. Her research interests include environmental exposures and health; policy oriented studies in environmental and occupational health; and health promotion. She has published a wide range of scholarly papers public health management, including disaster management, the effect of power plant emissions on children, unleaded gasoline, as well as Bangkok’s air quality with a special focus on particulate matter.

**Prof. WANG Xinming** is connected to the State Key Laboratory of Organic Geochemistry and Guangzhou Institute of Geochemistry (GIG), as well as a member of the Chinese Academy of Sciences. His expertise includes organic pollutants in the atmospheric and their health impacts.

**Dr. John WATSON**, Research Professor in the Division of Atmospheric Sciences at the Desert Research Institute in Nevada USA, is well-known for the organization and planning of large-scale multi-year air quality studies in the US, with government, state, and local agencies, academies, consulting firms, and instrument manufacturers. Dr Watson has been involved in numerous other atmospheric studies including: California Regional PM2.5/PM10 Air Quality Study (CRPAQS), and the National Academy of Engineering’s US Committee on Energy Futures and Air Pollution in Urban China and the United States.

**† Mr Anders WIJKMAN** has been a Member of the European Parliament since 1999, where he is currently a member of the Committees on Environment, Development Cooperation and Climate Change. Previously, he served as Assistant Secretary-General of the United Nations and Policy Director of UNDP (1995-1997), and Director-General of SAREC - Swedish Agency for Research Cooperation with Developing Countries - (1992-1994). He is chairman of GLOBE EU and the ZERI Foundation. He is a member of the Club of Rome, the Swedish Royal Academy of Sciences and the Swedish Royal Academy of Agriculture and Forestry and a Board member of the Stockholm Resilience Center.

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Prof. WONG Chit-ming is Associate Professor at the Department of Community Medicine, School of Public Health, University of Hong Kong. He obtained his Ph.D. from The University of Hong Kong. He is a Chartered Statistician of the Royal Statistical Society, UK, and an Honorary Member of the Faculty of Public Health of the Royal College of Physicians, UK. He is a co-ordinator for a multi-city study on public health and air pollution in Asia, and another multi-city study on the health impact of influenza in Hong Kong, Singapore and Guangzhou, as well as a study on the health effects of the 1990 regulation for restriction of sulphur content in fuels in Hong Kong.

*† Prof. WONG Tze Wai is a Professor of Community and Family Medicine at the Chinese University of Hong Kong. His primary research interest is the relationship between air pollution and health, including cardiovascular and respiratory diseases, a topic on which he has published widely in international journals. He is currently involved in a major research project on The Long-term Impact of Air Pollution on the Respiratory Health, Lung Functions and Cardiopulmonary Fitness among Schoolchildren.

Mr ZHANG Baochun is from the Guangzhou Research Institute of Environmental Protection. His fields of expertise include environmental management, planning and policy.

*Prof. Allen ZHENG is Professor at the South China University of Technology, Guangdong, China., with special expertise in the development of emissions inventories for monitoring air pollution in Guangdong.

Prof. ZHONG Liuju is from the Guangzhou Environmental Monitoring Center, with expertise in air quality monitoring, and air quality management at a regional scale.

*† Prof. ZHU Tong is Professor at the College of Environmental Sciences and Engineering and Director of the Centre for Environment and Sciences at Peking University. Air Pollution (especially particulate matter) and its related health impact is one of his main research focuses. He is the one of the leading professors in air pollution projects in the Pearl River Delta and was an advisor to the Beijing Olympics on air quality in Beijing.
APPENDIX 3 – PROGRAMME – EXPERTS SYMPOSIUM

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<td>8.30-9.00</td>
<td>Registration</td>
<td>Protecting Public Health in AQ Policy – Economics, Politics, and Law</td>
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<td>9.00-9.15</td>
<td>Welcome &amp; Introduction</td>
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<td>Moderator: Dr Christine Loh</td>
<td>Moderator: Prof. Bill Barron</td>
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<td>Special Guest: Mr William Y Yiu, Executive Director, Charities of The Hong Kong Jockey Club</td>
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<td>Special Guest Commentators:</td>
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Session 1
9.15-10.45  
**The Importance of Protecting Public Health in Framing Air Quality Policy**
Moderator: Prof. Tony Hedley
Special Guest Commentators:

Dr WM Chan: Setting the scene. patterns of respiratory illness in Hong Kong
Dr CM Wong: Application of studies on health effects of air pollution in Hong Kong
Prof. Ross Anderson: The WHO synthesis and interpretation of the world-wide evidence to update the advisory on achieving safer air to breathe.
Dr Aaron Cohen: Where are we now in Asia? Evidence on pollution levels, risks, burden of disease.
Prof. TW Wong: The Hong Kong situation from a public health viewpoint. the current standards. what is likely to come out of the current review. where is Hong Kong heading?
Dr John Froines: Latest news on PM$_{2.5}$ – implications for public health.
Dr Quentin Chiotti: What is the role of a valid, understandable, transparent system of risk communication in motivating and informing policymakers and the public?

Q&A Session and general discussion
10.45-11.15  
Morning tea

Session 2
11.15-12.30  
**Protecting Public Health in AQ Policy – Economics, Politics, and Law**
Moderator: Prof. Bill Barron
Special Guest Commentators:

Dr Terry Barker: What’s the economics of better managing air pollutants from marine sources? Why is an international arrangement for ship emissions desirable?
Dr Alan Lloyd: California and the story of transport and marine emissions control.
Dr Judy Chow: The role of systems of monitoring and review as tools to improve policymaking and policy-implementation in California.
Dr John Watson: The legal and political climate in the USA that drove improvements – any lessons for Hong Kong?
Mr Antonio da Roza: Review of air pollution laws in Hong Kong.
Prof. Michael DeGolyer: Hong Kong’s Silent Epidemic: results from the HK Transition Project’s Survey of Public Opinion on Air Pollution and Environment 2008.

Q&A Session and general discussion

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| 13.30-14.45| Session 3    | From Policy to Action and Review - Making it Happen | **Moderator:** Dr Christine Loh  
**Special Guest Commentators:**  
- **Prof. Nuntavarn Vichit-Vadakan:** The Bangkok experience – how has Bangkok used public health information in formulating policy for better air quality? Health trends and drivers of success.  
- **Prof. Zhu Tong:** The Beijing Olympics experience – what is needed to make a mega-event produce long lasting benefits for host cities?  
- **Dr Hu Tao:** Progress in Mainland China – a co-benefits approach to air pollution, climate change, and energy security.  
- **Dr Allen Zheng:** The Guangdong experience – The role of good data collection in improving air quality and public health.  
- **Mr Anders Wijkman:** Overview of European air policy over the last 40-50 years – What policy measures have been most effective and what still needs to be done?  
**Q&A Session and general discussion**

| Time       | Session 4    | Reflections and close                     | **Moderator:** Dr Christine Loh  
- Reflections from the small group discussions and guest commentators  
- Wrap-up, preview of tomorrow’s event, thanks, and close |

Afternoon tea and small group discussions – ‘Making it Happen in Hong Kong’