Strategies for Clean Air and Health

Rome, Italy 2003

CONFERENCE STATEMENT

The objective of the Statement is to provide guidance from the perspective of an international group of scientists, regulators, industries and interest groups on a path forward to improve the interface between science and clean air policy strategies to protect public health. This Conference Statement represents the main findings of two breakout group discussion sessions, supported by perspectives of keynote speakers from North America and Europe on science-policy integration and views of the delegates expressed in plenary discussions. NERAM undertook a carefully considered process to try to ensure that the Statement would accurately reflect the conference discussions, including documentation of supporting comments from the proceedings and inviting delegates' comments on two draft versions of the Statement. The Statement however, is not a consensus document and may not reflect the views of all conference delegates. All comments received and responses to comments are provided in the Appendix. This documentation provides insight into stakeholder perspectives on issues underlying the development of strategies for clean air and health.

Statement Summary

1. **Air Pollution is an Important Local, National and Global Public Health Concern**
2. **Implement Further Clean Air Policies Based on Current Scientific Knowledge**
3. **Initiate Innovative Research Approaches to Support Air Quality Policy Development**
4. **Improve Communication among Scientists, Policy Makers, Stakeholders and the Public**
5. **Use Exposure and Health Impact Assessments to Assess Benefits of Implemented and Future Regulations and to Develop Interventions**
6. **Initiate International Forum for Evaluation of Principles for Action and Integration of Air Quality Evidence for Policy**

An international Colloquium ***"Strategies for Clean Air and Health"*** was organized by the Network of Environmental Risk Assessment and Management (NERAM) and the AIRNET European Network on Air Pollution and Health to identify directions for air quality policy development and research priorities to improve public health. Two hundred air quality scientists, policymakers, industry representatives and non-governmental organizations from 22 countries convened in Rome, Italy on November 5-7, 2003 to exchange perspectives on the interface between policy and the science on air pollution health effects, air quality modeling, clean air technology, and policy tools. The conference was sponsored by US EPA, Health Canada, Ontario Ministry of Environment, Shell International, the Canadian Petroleum Products Institute, the European Commission and the Rome E Health Authority.

The Statement will provide the focus for NERAM Colloquia 2004 and 2005 and related initiatives to engage broader participation of government policymakers, corporate decision makers, non-governmental organizations, and policy-focused scientists at the international level in identifying and implementing best practice in air quality management. After having brought together scientists, stakeholders and policy makers at its first Annual AIRNET Conference (London 2002), the Statement of this 2003 second conference will provide a focus for AIRNET to better function as a platform and forum for the science-policy-stakeholder interplay. This new focus on end-user needs will also set the stage for the final Annual AIRNET 2004 Conference (Prague) addressing science and policy communication issues on air pollution and health.

1. Air Pollution is an Important Local, National and Global Public Health Concern

Epidemiologic studies conducted over the past decade to examine the link between community ambient PM concentrations and health continue to show that current levels of air pollution are a significant local, (inter)national and even global public health concern. The World Health Organization (2002) has identified ambient air pollution as a high priority in its Global Burden of Disease initiative estimating that air pollution is responsible for 1.4% of all deaths.[1] There is consistent and convincing evidence to show that both short term and long term exposures are associated with premature mortality and a range of cardiovascular and respiratory illnesses. Air pollution is a complex mixture of particulate and gaseous co-pollutants originating from both local and distant sources. Much of the recent research findings and policy development efforts address the health effects of ambient particulate matter (PM) and while delegates identified the important role of gaseous co-pollutants and air toxics, particulate matter was the predominant focus of discussion. PM is a very complex mixture and its chemical and physical composition varies over time and seems dependent upon meteorological and long-range transport conditions and specific source contributions. However, there is now a substantial body of evidence to show that PM_{10} and $PM_{2.5}$ are associated with adverse health effects in airways and lungs and the cardiovascular system. These particles, to which $PM_{2.5}$ forms a major constituent, originate i) directly from combustion and industrial processes, such as from large point sources like coal-fired power plants and steel mills, and from area and mobile sources such as vehicles and ii) indirectly through the complex atmospheric formation of secondary particles from precursor gases. These source emissions should be a priority for cost-effective risk reduction in affected airsheds. For the gaseous co-pollutants (e.g. CO, NO_x, SO_2, O_3) health effects of O_3, and perhaps also CO, are considered important, whereas others may serve as an indicator (surrogate) for the mixture without being a causal health effect agent themselves under the current (low) exposure levels. The health effects associated with exposure to ultrafine (UF) particles (<0.1 μm) continue to be a high research priority because bio-medical toxicology has discovered potentially important adverse reaction pathways, although specific UF epidemiology studies have been rather limited. Ultrafine particles from combustion processes, particularly vehicle engines, reach levels in urban streets, homes and workplaces and may have adverse effects for public health.

2. Implement Further Clean Air Policies Based on Current Scientific Knowledge

Although there is some scientific uncertainty about the specific components of air pollution that are most responsible for health effects and the exact mechanisms of these effects, there is sufficient confidence in the information available for policymakers in affected airsheds to take further immediate actions. In North America and Europe, a wide range of clean air strategies have already been implemented (i.e. Tier 2 motor vehicle emission standards[2], ambient air quality standards and limit values, emission limits for industrial facilities, emission ceilings for countries), while other policy strategies and emerging new technologies for emission reduction will be implemented over the long term (fuel cells, gasification of coal, electricity generation by gas turbine (already has widespread applications in California and elsewhere), etc.). While these strategies are designed and expected to improve air quality and public health, additional policies are still needed in specific airsheds throughout the world to lower air pollution to healthy or acceptable levels. Air quality monitoring has demonstrated that historical air pollution abatement programs have been effective in reducing ambient levels of air pollution. Studies in southern California, Hong Kong, Ireland, Erfurt, Utah Valley and Atlanta have demonstrated health benefits from emission controls and other interventions. Further monitoring and research is needed to

[1] Cohen AJ, Anderson HR, Ostro B, Pandey KD, Krzyzanowski M, Kuenzli N, Gutschmidt K, Pope CA, Romieu I, Samet JM, Smith K. 2003. Mortality Impacts of Urban Air Pollution. In: Ezzati M, Lopez AD, Rodgers A, Murray CJL (Eds). Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attributable to Selected Major Risk Factors. Geneva: World Health Organization. In Press.

2 Emission standards set by USEPA in 1999 for all cars, light trucks, and larger passenger vehicles, including sport utility vehicles (SUVs) and passenger vans to reduce NOx and non-methane organic gases. Full compliance should be achieved by 2009 with phase in based on vehicle class. Also establishes limits on sulfur concentrations in gasoline.

ensure that existing and future policy approaches indeed lower population exposure and improve public health.

The presentations and discussions at the Conference identified the following strategies and guidelines for the development of clean air policies:

- Focus on policies that are likely to achieve broad population health co-benefits. For example, integrate clean air objectives within urban planning and community design (green spaces, public transport, traffic demand management), no-regrets climate change policies, energy conservation and energy efficiency programs, and health promotion planning, such as in the areas of obesity, diabetes and substance abuse (e.g. tobacco).
- Emission reduction strategies should target all relevant emission sources which contribute to pollution levels in an affected airshed(s). With respect to ambient PM there is a need to focus on those fractions and sources that are suggested to be toxicologically most important (if sound data exist).
- Reduce pollutants that are likely to result in multiple benefits for air quality, for example, precursors that form both fine PM and ozone such as NOx.
- There are potentially cost-effective control measures for reduction of emissions from small scale combustion sources including domestic heating.
- Adopt a risk-based approach to quantitative impact assessment and policy development considering predicted effectiveness and its uncertainties, estimated benefits and costs, and implementation time and feasibility.
- Engage the public and other stakeholders early in the process to help design, focus and build support for policy changes that directly affect them (e.g. urban transportation solutions, energy conservation and sustainable development).
- Improve linkages with the medical and patient communities to promote their roles in providing an early warning on adverse health effects of air pollution, in credible communication of information, and advocates for solutions.

3. Initiate Innovative Research Approaches to Support Air Quality Policy Development

Continued support for research to improve the scientific basis for the development of air quality policies and strategies is important; however this research should be targeted at areas that will yield information useful in improving public health and contribute to a sustainable living environment. It is likely that the scope of future research needs to be broadened beyond narrow disciplines in order to provide evidence required to support specific policy decisions. There is a need and an opportunity to initiate innovative approaches to health effects research including international cross-disciplinary research to integrate epidemiology, toxicology, and clinical studies; risk-based approaches and health impact assessment methodologies; collaboration among scientists with opposing views; and testing of plausible untested hypotheses. For example, improving access to existing health datasets while assuring patient confidentiality will assist scientists in providing timely research results to support policy recommendations such as standard setting or determining the effectiveness of solutions.

Priority areas for research to guide policy and to demonstrate the exposure and health-effectiveness of control regulations include further studies to better understand the causal agent(s) involved in the air pollution mixture that are responsible for the associations with adverse health outcomes, and to characterize the health effects associated with various air pollution sources. Health effects studies should continue to focus on identifying susceptible subgroups and understanding social and other determinants that may be associated with increased risk.

4. Improve Communication among Scientists, Policy Makers, Stakeholders and the Public

The key to an effective science-policy interface is through interactive dialogue among the scientific community, policy-makers, stakeholders, and the public. Informed public opinion can bring about rapid policy changes. The scientific community has a central role to play in engaging policy-makers and NGOs to ensure that science is understood and presented in an appropriate manner to the public. It is necessary to accurately communicate and openly debate the health effects of air pollution to raise public awareness of the relative importance of the health risks and to create the momentum and support for appropriate policy changes. It is also necessary to include a better participatory approach for policymakers, stakeholders, and the public to effectively communicate end-user needs to the scientific community.

Policymakers need information on the current state of science on air pollution health risks. They also need information on the degree and significance of scientific uncertainty in drawing conclusions in specific areas. More dialogue between policymakers and scientists is necessary, particularly to identify information needs for policy decisions and to determine the degree of certainty required in the science in order to take action. Such dialogue should be used to assist in targeting research expenditures towards critical information needed for policy development. The pace and extent of actions associated with reducing ambient air pollution levels vs other public health interventions also needs to be identified; to address this will require additional technical and process skills. The scientific community is challenged to play a larger role in communicating with policymakers the importance of their findings and implications for policy options. The following approaches to improving the communication of science for policymakers are suggested:

- Establish guidelines for publishing epidemiological studies, including a consistent format for reporting risks, uncertainties and a requirement to identify key policy implications of the results. The standard reporting requirements of the Journal of Epidemiology and Community Health, the CONSORT process[3], and the "AIRNET Alert" non-specialist summary approach are examples to follow. This would provide information in a format would facilitate systematic review of the literature in support of policy decisions.
- Establish communication frameworks between scientists, policy makers, stakeholders, and interested parties to create a widely accepted basis for public health policy to improve air quality and to communicate and understand each other's needs.
- Establish a common terminology through which scientists communicate messages with policymakers to summarize what is known based on the balance of evidence and to describe in qualitative terms the associated levels of certainty.
- Establish a common language around the concept of "associated effects" and the interpretation of "causality".

3 The CONSORT statement facilitates critical appraisal and interpretation of randomized, controlled trials (RCT) by providing guidance to authors about how to improve the reporting of their trials. The statement consists of a checklist and flow diagram that authors can use for reporting an RCT. Many leading medical journals and major international editorial groups have adopted the CONSORT statement.

5. Use Exposure and Health Impact Assessments to Assess Benefits of Implemented and Future Regulations and to Develop Interventions

Quantitative health impact assessments and assessments of possible exposure and health benefits from air pollution abatement actions are challenged with large uncertainties regarding health effects, concentration-response relationships, and identification of causal pollutants which may become a suitable target for control. Nevertheless, techniques for assessing the possible effectiveness of complex emission reduction scenarios such as Cost Benefit Analysis or Cost Effectiveness Analysis are useful in identifying pollutant reduction strategies with multiple benefits on human health and the environment. The use of these *ex ante* policy analysis tools and broader Health Impact Assessment methodology should assist in the fair and reasonable treatment of risk factors, including exposure, measurement of PM and gaseous pollutants, special susceptibility of population sub groups, and degree of certainty. However, predictions about future benefits of air pollution abatement strategies should be treated with caution and should always include an analysis of uncertainties.

6. Initiate International Forum for Evaluation of Principles for Action and Integration of Air Quality Evidence for Policy

There is a need for an international independent, systematic and regular evaluation of the scientific evidence on air quality health effects for purposes of assisting policymakers. Such tasks have been carried out previously by the UK Committee on Medical Effects of Air Pollutants (COMEAP) for the United Kingdom on a national level, by WHO Euro e.g. for the European region of WHO and the European Commission, and the WHO International Agency for Research on Cancer (IARC). A well-defined methodology for assessing the evidence systematically (e.g., weighting studies according to research design criteria) has been applied in such exercises to pool and integrate the results of the international literature on toxicology, epidemiology, socio-economic analysis and other policy analysis tools. An international review of principles for air quality policy development (socio-economic analysis, precautionary principle, health effects, ethical considerations etc.) should be undertaken to exchange perspectives on how these principles are implemented under various circumstances (e.g. different legal systems) and to identify strengths and weakness associated with each of the approaches.