AIRNET was a thematic network project (2002–2004) initiated to stimulate the interaction between researchers in air pollution and health in Europe. As part of AIRNET’s communication strategy, a standardized workshop model was developed to organize national meetings on air pollution and health (AIRNET network days). Emphasis was given to tailor the national workshop information and related activities to the specific needs of a wider range of stakeholders (e.g., policy makers, nongovernmental organizations, industry representatives). In this report we present an overview of the results of four workshops held in western, northern, central/eastern, and southern regions of Europe in 2004. Overall, workshop experiences indicated that by actively involving participants in the planning of each meeting, AIRNET helped create an event that addressed participants’ needs and interests. A wide range of communication formats used to discuss air pollution and health also helped stimulate active interaction among participants. Overall, the national workshops held by AIRNET offered a way to improve communication among the different stakeholders. Because a broad stakeholder involvement in decision making can positively affect the development of widely supported policies, such meetings should be continued for Europe and elsewhere. **Key words:** air pollution and health, communication, stakeholders, thematic network.

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A well-established body of evidence now shows that increasing levels of air pollution are linked with more illness, higher use of health services, and earlier death among the exposed population groups (Brunekreef and Holgate 2002). Recently, five disciplinary reports by AIRNET (Thematic Network on Air Pollution and Health) have addressed the evidence in the European Union (EU) from a variety of scientific perspectives, including epidemiology, toxicology, exposure assessment, health impact assessment, and the science–policy interface (AIRNET 2005a, 2005b, 2005c, 2005d, 2005e). Overall, these reports indicate that European research has significantly contributed to the better understanding of air pollution health effects.

AIRNET was a thematic network project (2002–2004) initiated to stimulate the interaction between researchers in air pollution and health in Europe (AIRNET 2002). AIRNET collected, interpreted, and disseminated information from individual (EU-funded) projects to strengthen the science–policy interface and to draw policy-relevant recommendations. The objective of this stakeholder network was to create a widely supported basis for public health policy related to improving air quality in Europe—for instance, the communication of scientific findings for policy use and the identification of important gaps in the research. Overall, 23 project partners were initially brought into AIRNET, representing the scientific community and a variety of other stakeholders with an interest in air pollution and health.

Several reports stress the importance of stakeholder involvement in understanding the science at all stages of the decision-making process (Beierle 2002; Maynard et al. 2003; Tamburlini and Ebi 2002). Realizing the need for more stakeholder input, AIRNET strove to increase the number and diversity of participating stakeholders with varied interests deriving from a local, national, or regional perspective. To make the wealth of gathered and interpreted information available to a broader spectrum of stakeholders, two things were considered paramount: first, a fine-tuning of the information required to meet the needs of different stakeholders; and second, a well-focused effort undertaken to actively involve more stakeholders, including those who previously might not have had any contact with AIRNET.

Therefore, a major goal of the activities of AIRNET in its final year was to help bridge the gap between scientists, policy makers, and other relevant stakeholders. To this end, the communication strategy focused on the concept of national workshops (AIRNET network days). The workshop model gave the participants an opportunity to influence the planning of the meeting in line with their interests and needs. Ideally, such an approach should produce an atmosphere where stakeholders can comfortably create, broaden, and intensify their own personal network and can share their knowledge and questions. In this report we present the findings from four workshops organized to communicate and discuss air pollution and health issues specific to western, northern, central/eastern, and southern regions of Europe.

**Methods**

Four countries (the Netherlands, Sweden, Hungary, and Spain) representing different European regions (western, northern, central/eastern and southern) were selected to address region-specific air pollution and health issues in a standardized workshop format developed by AIRNET’s communication firm (Korbee & Hovelynck BV). Although the underlying approach used to organize the national workshops is a traditional management strategy, it is a little-used strategy in many scientific areas, especially for air pollution and health.

As illustrated in Figure 1, the first step was for a national AIRNET coordinator (i.e., a scientist or a representative from a government agency) to select a local communication agency that could perform a stakeholder analysis to identify relevant target groups according to their interests in air pollution and health. The communication agency chosen was either a commercial public relations firm or a professional conference management agency.

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firm with suitable experience in the field of
public relations. Once the stakeholder list was
compiled and preliminary invitations to the
workshop were sent out, focus group discus-
sions or interviews were held with representa-
tive stakeholders. The local communication
agency organized these sessions and aimed to
have stakeholder input from each stakeholder
group identified in the stakeholder analysis.

The goal of the focus group discussions and
interviews before the workshop was to under-
stand what the stakeholders needed, how they
could contribute to the meeting, and what the
preferred means were for commu-
nicating and exchanging knowledge and
opinions. There was also an opportunity to
widen participation by asking stakeholders for
the names of other interested parties who may
have been missed in the initial stakeholder
analysis. As the national workshops were held
at different times throughout the year, we
were able to build on the experiences and
results of previous workshops to help develop
subsequent events.

All the authors have been involved in the
planning and participation of one or more of
the workshops. For the overall descriptions,
discussion, and evaluation of the workshops,
the authors draw on their experiences and
observations as well as any informal discus-
sion with the participants.

Results and Discussion
Stakeholder participation. Participants at the
workshops were classified into several stake-
holder categories (Table 1): scientists (i.e., air
quality, health) who perform research, policy
makers (local, regional, national), industry rep-
resentatives (i.e., automobile, oil, and gas), and
nongovernmental organizations (NGOs) (e.g.,
patient rights, public health, and the environ-
ment). Additional stakeholders included partic-
ipants who represented public transportation
operators and clean fuel companies, and
NGOs that advocated for public transport and
cycling. Except at the Netherlands workshop,
researchers were represented in the highest per-
centage. In general, policy makers were second,
followed by NGOs and industry representa-
tives—all of whom use research findings.
Overall, AIRNET appears to have achieved a
wide range of stakeholder participation at the
national workshops between producers and
users of research.

In general, the policy makers who
attended the workshops represented national
ministries dealing with the environment,
meteorology and climatology, health care,
and traffic. Other than those from a few of
the municipalities where the meetings took
place, few regional or municipal policy mak-
ers were present at the workshops. On the
whole, the NGOs participating in the work-
shops represented a wide range of stakehold-
ers, from consumer groups, environmental
protection and management and environ-
mental law, to environmental health advocacy
for susceptible individuals (i.e., asthmatics
and children). These NGO groups were typi-
cally functioning at the national interest level,
sometimes under the umbrella of an interna-
tional or pan-European parent organization.

Some stakeholder groups mentioned that
international conferences (objectives, themes,
content) are often biased toward researchers,
making it less attractive for nonscientists to
participate. Furthermore, some stakeholders
groups (e.g., NGOs and local policy makers)
find it difficult to attend international confer-
ces because of budgetary and time con-
straints. This was demonstrated in the yearly
AIRNET conferences, which were attended
predominantly by scientists (Table 1). How-
ever, by offering local events where the
attendee is involved in the design and setup,
AIRNET has shown a way to increase the
diversity of participation (see also Huntington
et al. 2002). We are confident that workshops
tailored to the participants’ interests increased
the level of participation from all stakehold-
ers, thereby demonstrating their potential use-
fulness as a medium through which to help
develop consensus on research or policy.

Workshop communication formats. The
available work formats varied little from
country to country, despite the fact that
stakeholders were encouraged to indicate their
preferred methods of communication. As
indicated by the preworkshop focus group
discussions and stakeholder interviews, the
use of conventional presentation formats
(seminar presentations, poster presentations)
and roundtable discussions were favored. At
three of the workshops, nonconventional
activities (silent wall discussions, speaker’s
corner, literature table, events calendar, con-
tact board) were also used to stimulate stake-
holder participation. Overall, every effort was
made to ensure that the messages were rele-
vant and easily understood to help stimulate
stakeholder dialogue.

By using the proper meeting format, shar-
ing knowledge can become more effective,
widely, and fine-tuned to meet different
stakeholder needs (Huntington et al. 2002).
However, the importance of selecting the
most appropriate communication or work
format for the intended audience is often
overlooked by meeting organizers. In some
instances, the use of conventional formats
can be too passive to promote discussion.
However, combined with more interactive
methods, conventional formats can provide
the information needed to fuel conversation.
For example, silent wall discussions (reacting
in writing to a statement on a blank poster) or
a speaker’s corner presentation (analogous to
a soapbox speech in London’s Hyde Park) can
encourage people to become more active and
allow alternative ways to participate.

Because of potential differences in air pol-
lution and health issues and the communica-
tion styles among European regions, emphasis
was given to tailoring information and work
formats to the needs of the target groups. The
workshops were also held in the national lan-
guage, effectively removing potential barriers
to communication caused by language.
AIRNET’s experiences at each national work-
shop suggested that the selected work formats,

![Figure 1. General schematic of the national workshop model.](image-url)

**Table 1. Overview of national workshop attendance by stakeholder category.**

| Workshop     | Meeting length (hr) | No. of participants | Research (%) | Industry (%) | Health (%) | Environment (%) | Policy (%) | Transport and mobility (%) |
|--------------|---------------------|---------------------|--------------|--------------|------------|-----------------|------------|---------------------------|
| Netherlands  | 4                   | 52                  | 23           | 12           | 10         | 83              | 42         | 6                         |
| Sweden       | 5.5                 | 54                  | 36           | 13           | 2          | 4               | 20         | 6                         |
| Hungary      | 5                   | 40                  | 56           | 13           | 3          | 18              | 15         | 10                        |
| Spain        | 6                   | 39                  | 20           | 5            | 35         | 20              | 10         | 0                         |
| 3rd Annual Conference | 2.5 days | 138                | 64           | 9            | 7          | 5               | 15         | —                         |
room setups, chosen moderator, and rules for roundtable discussions were of prime importance in helping the stakeholder feel comfortable in contributing to the discussion. Overall, participants at the workshops reaffirmed the need to encourage successful two-way dialogue between stakeholders through both conventional and nonconventional communication methods.

**Major themes of stakeholder interest.** Interviews and focus group discussions can provide better insight on stakeholder questions (Lion et al. 2002). Our focus group discussions and interviews produced a list of themes for workshop agendas that varied slightly by country (Table 2). The most prominent theme for all workshops was traffic-related air pollution and human health. Except for Spain, air quality standards were also of major interest. In addition, issues on asthma and allergy, as well as child/infant health, were a major focus for three of the five workshops. Except for Hungary, policy options aimed at air pollution and health were included in the program.

These initial themes were used to help promote attendance at each workshop but not necessarily to drive the direction of the discussion among participants. In the end, the Netherlands and Hungary roundtable discussions focused on the need to a) increase and improve public transportation, and b) encourage the public to take environmentally friendly steps to reduce the volume of traffic. Similarly, participants from the Swedish workshop indicated that health-orientated decision making would benefit from a) the development of traffic-related indicators of air quality, b) acute and chronic health effect studies for traffic, and c) integration of traffic and health policy with policies for air pollution reduction. For more detailed summaries of each workshop, see the AIRNET Web site (AIRNET 2002).

Although the workshop themes varied little among countries (Table 2), key messages emerging from each workshop were different in scope (Appendix 1). For instance, the effects of wood burning and spring dust were important topics in Sweden. In Hungary, many of the discussions focused on the health effects of ragweed exposure. Participants at the Netherlands workshop placed a greater focus on actions for the government and policy makers. In Spain, a dry climate resulting in dust production was an issue of importance among the attendees.

**European scope of the national workshops.** A geographical spread (northern, western, central/eastern, and southern Europe) of national workshops allowed discussion of air pollution and health issues specific to each region. This aided in attracting policy makers and other stakeholders (e.g., environmental and health organizations) working at the local, regional, or national level (Table 1). A broad diversity of stakeholder perspectives helps improve decisions over the status quo by adding new information and ideas while ensuring adequate access to resources (Beierle 2002).

As a converging point for the national workshop activities on a European and regional level, answers to several questions posed during the parallel breakout sessions at the Third AIRNET conference are listed in Appendix 2. At this pan-European meeting, discussions relating to policy and decision-making priorities and the value of national or regional meetings reinforced AIRNET network activities (workgroup meetings, conferences, AIRNET network days). Overall, for all regions of Europe, improved communication between scientists, decision makers, and stakeholders was seen by the participants as highly desirable to increase the effectiveness of decision-making processes for environmental health improvement.

**Participant feedback.** Participant feedback from the workshops was positive. On a scale of 1 to 10 (where 1 is bad and 10 is good), the overall ratings by participants in the Netherlands, Sweden, and Spain were 7.9, 7.2, and 8.1, respectively. No rating was available for Hungary.) Most participants at each workshop felt that the objectives of the day, to exchange knowledge and strengthen personal networks, were well achieved. Moreover, participants were positive about the work formats used (specifically the roundtable discussions), despite not having worked in such formats before. Overall, most participants felt that it would be valuable to hold events of this type in the future, providing valuable feedback for the organizers.

**Table 2.** Major themes of interest included in the national workshop programs.

| Workshop           | Traffic | Allergy and asthma | Children/infant health | Indoor air quality | Air quality standards | Other policy options |
|--------------------|---------|---------------------|------------------------|--------------------|-----------------------|----------------------|
| Netherlands        | x       |                     |                        |                    |                       |                      |
| Sweden             | x       |                     |                        |                    | x                     | x                    |
| Hungary            | x       | x                   | x                      | x                  | x                     |                      |
| Spain              | x       |                     |                        |                    |                       |                      |
| 3rd Annual Conference | x     | x                   | x                      | x                  | x                     | x                    |
Concluding Remarks

How will such workshop activities continue? Who has the time and inclination to organize them? How is discussion translated into action?

Answers to the above questions are challenging, given AIRNET’s initial focus and the relatively short mandate given by the EU (3 years). Nonetheless, these issues were dominant at the final AIRNET conference, where attendees clearly wanted events that enhanced participant interaction (Appendix 2). However, since AIRNET officially ceased to exist in 2005, other supporters (EU, national governments, NGOs, industry, etc.) will need to take the initiative and time to organize, sponsor, and promote similar events. Doing so may help ensure that future actions are taken by maintaining a direct link with those who will be making the decisions. Although the issues are often big and the meeting times relatively short, events such as national workshops can be seen as a beginning or continuation of the existing dialogue and debate.

A limitation of the workshops (which were not initially part of AIRNET’s planned activities) is that they did not examine the steps needed to achieve subsequent actions resulting from the workshops. However, a legacy of these activities is the creation of a stakeholder network that will continue to interact (at some level) through other means. For example, many of the participants of the workshop in Spain decided that they would continue to communicate and work toward collectively feeding into policy debate in their country. Reducing environmental exposures may also require substantial financial investment, where broad support by a variety of stakeholders can be achieved through meaningful, relevant, and understandable communication. For a variety of reasons, this publication of the meetings summary is a step toward action rather than just keeping ideas merely at the level of discussion. This is important, if not critical, for comprehensive and sound management of any real or perceived risk to the human health (Jardine et al. 2003).

Well-planned and -moderated workshops can enhance communication and knowledge sharing among individuals who do not know each other well (or at all) and have different levels of understanding (Huntington et al. 2002; Kontic et al. 2006). Through activities such as the AIRNET national workshops, we believe that a substantial contribution to research planning or influencing policy can be achieved by ensuring that stakeholders are familiar with the extent of the knowledge base (and its limitations or gaps) and how to gain access to this information.

Stakeholders are able to use the information (available in a suitable format) for practical application in their own fields of specialty (Sanderson et al., in press). Stakeholders know whom to turn to with specific questions and will do so actively. Stakeholders know with whom they can share their acquired knowledge to maximize the impact of their efforts and help others in their pursuits. Stakeholders have a sufficient understanding of the subject matter under policy scrutiny to make a constructive and positive contribution to the decision-making process.

In conclusion, we feel that the national workshops were highly valuable in promoting participant interaction and improving communication among a wide range of stakeholders. Herein, active participation is key to enable a two-way flow of information. By bringing together the relevant stakeholders, well-planned workshops can empower a group of individuals who share a common interest or vision to participate collectively in the policy debate.

Appendix 1. Examples of key messages resulting from the national workshops.

Netherlands (western Europe) network day:
• Development of an integrated air pollution and climate policy.
• Harmonization and validation of the models used to assess urban air quality.
• Investigation of methods to protect the environment, with open options for managing local hotspots.

Sweden (northern Europe) network day:
• Need for action and research is most important for particulate matter from road and tire wear.
• Health effects of ozone have been somewhat forgotten—a need to refocus some attention.
• Maintenance of an air quality standard for the coarse fraction of particulate matter.

Hungary (central/eastern Europe) network day:
• Air quality limit value system should be as dynamic as possible and monitored continuously.
• Means of transportation and urban planning should be developed in consideration of health issues.
• Allergy is the endemic of the 21st century, necessitating suitable preventative measures.

Spain (southern Europe) network day:
• Need for a professional organization to oversee monitoring station criteria for the EU.
• Promotion for the reduction of air pollution (i.e., urban planning, technology, public information).
• A shift from epidemiological surveillance to more vigilance toward lifestyle risk factors.

Network day summaries in English are available on the AIRNET Web site (http://airnet.iras.uu.nl/).

Appendix 2. Summary of the Third AIRNET Conference regional breakout sessions.

Within our region, what air pollution and health problems and abatement needs do we have in common?
• Northern Europe: soil dust, noise, and traffic-related emissions.
• Western Europe: primarily particulate matter, although nitrogen dioxide is still an issue.
• Central/eastern Europe: air quality affected by local heating and traffic.
• Southern Europe: traffic-related emissions, desert dust, and secondary air pollutants.

What have we learned from this conference that we can take home/applied to our region?
• Northern Europe: promotion of bicycle use to decrease traffic-related air pollution.
• Western Europe: lack of clear communication among scientists, policy makers, and stakeholders.
• Central/eastern Europe: improvement in the public understanding of environmental health issues.
• Southern Europe: good public transportation is needed to decrease traffic in cities.

What are the research priorities for our region?
• Northern Europe: confirmation of the improvement in air quality as a result of implemented policy.
• Western Europe: carrying out long-term health studies of low-concentration air pollutants.
• Central/eastern Europe: impact of changing air pollution on human health, especially in children.
• Southern Europe: research targeted on defining source and composition of air pollution.

Session summaries in English are available on the AIRNET Web site (http://airnet.iras.uu.nl/).
REFERENCES

AIRNET (Thematic Network on Air Pollution and Health). 2002. AIRNET: A Thematic Network on Air Pollution and Health. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl [accessed 19 May 2006].

AIRNET (Thematic Network on Air Pollution and Health). 2005a. Air Pollution and the Risks to Human Health—Epidemiology. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl/airnet wg2_epidemiology_report.pdf [accessed 19 May 2006].

AIRNET (Thematic Network on Air Pollution and Health). 2005b. Air Pollution and the Risks to Human Health—Exposure Assessment. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl/airnet wg1_exposure_report.pdf [accessed 19 May 2006].

AIRNET (Thematic Network on Air Pollution and Health). 2005c. Air Pollution and the Risks to Human Health—A Toxicological Perspective. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl/airnet wg2_toxicology_report.pdf [accessed 19 May 2006].

AIRNET (Thematic Network on Air Pollution and Health). 2005d. Air Pollution and the Risks to Human Health—Health Impact Assessment. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl/airnet wg4_hia_report.pdf [accessed 19 May 2006].

AIRNET (Thematic Network on Air Pollution and Health). 2005e. Air Pollution and the Risks to Human Health—Science/Policy Interface. Utrecht, the Netherlands: Institute for Risk Assessment Sciences, Utrecht University. Available: http://airnet.iras.uu.nl/airnet wg5Spi_report.pdf [accessed 19 May 2006].

Beierle TC. 2002. The quality of stakeholder-based decisions. Risk Anal 22:739–750.

Bell ML, Davis D, Cifuentes L, Cohen A, Gouveia N, Grant L, et al. 2002. International expert workshop on the analysis of the economic and public health impacts of air pollution: workshop summary. Environ Health Perspect 110:1163–1168.

Brunekreef B, Holgate ST. 2002. Air pollution and health. Lancet 360:1233–1242.

Ginsburg EO, Cowling EB. 2003. Future directions in air-quality science, policy, and education. Environ Int 28:125–135.

Huntington HP, Brown-Schwalenberg FK, Frost KJ, Fernandez-Gimenez ME, Norton DW, Rosenberg DH. 2002. Observations on the workshop as a means of improving communication between holders of traditional and scientific knowledge. Environ Manage 30:778–792.

Jardine CG, Hrudey SE, Shortreed JH, Craig L, Krewski D, Furgal C, et al. 2003. Risk management frameworks for human health and environmental risks. J Toxicol Environ Health B 6:569–641.

Kontic B, Bohanec M, Urbancic T. 2006. An experiment in participative environmental decision making. Environmentalist 26:5–15.

Lion R, Meertens RM, Bot I. 2002. Priorities in information desire about unknown risks. Risk Anal 22:765–776.

Maynard R, Krewski D, Burnett RT, Samet J, Brook JR, Granville G, et al. 2003. Health and air quality: directions for policy-relevant research. J Toxicol Environ Health A 66:1891–1904.

O’Neill MS, Jerrett M, Kawachi I, Levy JI, Cohen AJ, Gouveia N, et al. 2003. Health, wealth, and air pollution: advancing theory and methods. Environ Health Perspect 111:1861–1870.

Samet JM, Lee NL. 2001. Bridging the gap: perspectives on translating epidemiologic evidence into policy. Am J Epidemiol 154(512):51–53.

Sanderson EG, Fudge N, Totlandssdal AI, Brunekreef B, van Bree L. In press. Stakeholder needs for air pollution and health information. J Toxicol Environ Health Part A.

Tamburlini G, Ebi KL. 2002. Searching for evidence, dealing with uncertainties and promoting participatory risk management. In: Children’s Health and Environment: A Review of the Evidence (Tamburlini G, von Ehrenstein O, Bertollini R, eds). Copenhagen: European Environment Agency and the World Health Organization Regional Office for Europe, 199–206.

WHO. 2000. Evaluation and Use of Epidemiological Evidence for Environmental Health. Guideline Document. Copenhagen: World Health Organization, Regional Office for Europe. Available: http://www.euro.who.int/document/e68940.pdf [accessed 28 February 2006].

WHO. 2001. Quantification of the Health Effects of Exposure to Air Pollution: Report of a WHO Working Group. Copenhagen: World Health Organization, Regional Office for Europe. Available: http://www.euro.who.int/document/e74256.pdf [accessed 28 February 2006].

WHO. 2003. Health Aspects of Air Pollution with Particulate Matter, Ozone and Nitrogen Dioxide: Report of a WHO Working Group. Copenhagen: World Health Organization, Regional Office for Europe. Available: http://www.euro.who.int/document/e76907.pdf [accessed 28 February 2006].