

Proceedings

Final Stakeholders Meeting

2 March 2011

Institut de veille sanitaire, Saint-Maurice, France

Welcome address by **Georges Salines** – Director, Department of Environmental Health, French Institute for Public Health Surveillance, InVS, France

Good morning! And welcome to the InVS and to the final meeting of the Aphekom project, which is dedicated to improving knowledge and communication for decision making on air pollution and health in Europe.

Before talking about Aphekom, I'd like to say a few words about the missions of the InVS. These include epidemiological surveillance; global public health intelligence; health warnings; and support in the management of health crises.

More specifically, the Department of Environmental Health, which I head, is responsible for assessing and monitoring the global impact of the environment – including the air, water and climate – on public health, and its impact at the local level and for disadvantaged populations. The department is also responsible for biomonitoring; for the epidemiological surveillance of all types of poisoning; and for the development of methodologies.

As an introduction to Aphekom, monitoring the health impacts of air pollution provides an important tool for decision making on the local, national and European levels. For this reason and as part of its mission to support decision making, in 1999 InVS created the first European surveillance system to monitor the health effects of air pollution, known as Apheis, which stands for “Air Pollution and Health: a European Information System.”

Building on the learnings of the Aphea, Erpurs and Psas projects, Apheis developed standardised methods for data collection, for epidemiological analysis and for health-impact assessments to allow comparability of findings across large European cities.

To ensure ongoing support for decision making, Aphekom follows in the footsteps of the Apheis project in providing continued surveillance of the impact of air pollution on health in Europe.

So today we'd like to share the main findings of the Aphekom project with you. Thank you!

Introduction by **Sylvia Medina** – Aphekom Project Coordinator, French Institute for Public Health Surveillance, InVS, France

Thank you, Georges. To expand on what you said, Aphekom's ultimate goal is to deliver new information and tools on the health and monetary impacts of air pollution to help decision makers set more effective European, national and local policies; health professionals to better advise vulnerable individuals; and the general public to better protect its health.

Sixty Aphekom scientists have therefore worked for nearly 3 years in 25 cities in 12 countries across Europe to answer, among others, the four questions we will address in the first part of this morning's programme, in specific:

Question 1: What are the latest findings on the health impacts and monetary costs of air pollution in European cities?

Question 2: How can we make HIAs more meaningful and actionable for developing policies and recommendations on air pollution for urban populations?

Question 3: Do policies designed to reduce air pollution and its health impacts really work? And what are the monetary benefits?

Question 4: How can we improve communication both among and between scientists and stakeholders concerned with the impact of air pollution on health?

During the first session this morning, leaders of the Aphekom work packages will briefly present key learnings of our work. For the second session, we have scheduled four round tables that will discuss the issues surrounding air pollution and its health impacts on the local, regional, national and European levels with representatives from various ministries, the European Commission, NGOs and local and national administrations. I would like to thank all of them for participating in these round tables and adding their valuable input to the discussions.

Before we begin our first session, as part of Aphekom's ongoing assessment of its users' needs we want to understand how you learn about air pollution, how you perceive its impact on public health, and what information you need in this area that you're not getting.

For this purpose, we have prepared a quick questionnaire that you will find in your folder for today's meeting. Please take a couple of minutes to fill it in, and place it in the boxes provided for this purpose near the door.

The questionnaire is also posted on www.aphekom.org, where you can fill it in online after the meeting. Many thanks!

In conclusion, I want to thank everyone at InVS who has made this meeting possible, with special thanks to Kanwal Eshai and Isabelle Jaeglé for their unstinting support and help with the project.

And last but not least, our thoughts are with our colleague Olivier Chanel at the CNRS, the French Centre for Scientific Research, who unfortunately cannot be with us today.

Key Aphekom learnings

[[A note to readers](#): The following presentations only describe key findings of our work. When they are completed, we will post the full report and other documents on our Web site at www.aphekom.org]

What are the latest findings on the health impacts and monetary costs of air pollution in European cities?

Christophe Declercq, Mathilde Pascal, Magali Corso, – French Institute for Public Health Surveillance, InVS, France

Olivier Chanel, National Centre for Scientific Research, GREQAM and IDEP, Marseille, France

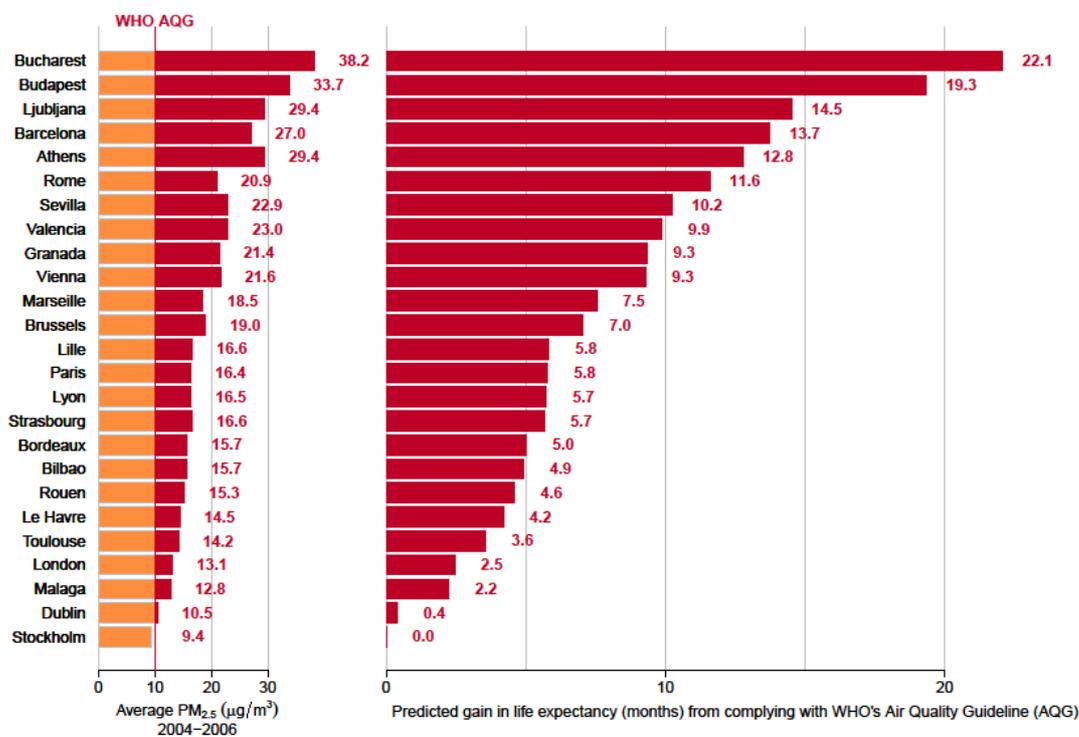
Aphekom's work package 5 (WP5) assessed the health impacts of urban air pollution in 25 European cities. For this purpose, WP5 performed a standardised health impact assessment (HIA) using the latest scientific evidence for particulate matter (PM) and ozone (O₃). The findings update those produced by Aphekom's predecessors, the European Aphis and Enhis projects.

Two types of scenarios for changes in air pollution (as measured by the levels of PM and O₃) were investigated: a decrease by a fixed amount in the concentration of the pollutant, for example a decrease by 5 µg/m³ in PM_{2.5} levels; and a decrease in the pollutant level to the standard set by the WHO air quality guidelines (WHO-AQG), for example to 10 µg/m³ for PM_{2.5} fine particles.

Before carrying out the HIA, relevant exposure and health data were collected following common guidelines defined by the WP5 team. For the study area defined, data on air quality (PM and O₃ levels) was collected to estimate average population exposure. Data on mortality and hospitalisations was collected to estimate the health impacts. And concentration-response functions were selected from recent multicity epidemiological studies.

The HIA showed that a decrease to 10 µg/m³ (WHO's annual AQG) of long-term exposure to PM_{2.5} could add up to 22 months of life expectancy for persons 30 years of age and older, depending on the city and its average level of PM_{2.5} (see figure below).

Predicted average gain in life expectancy (months) for persons 30 years of age and older in 25 Apekom cities for a decrease in average annual level of PM_{2.5} to 10 µg/m³ (WHO's Air Quality Guideline)



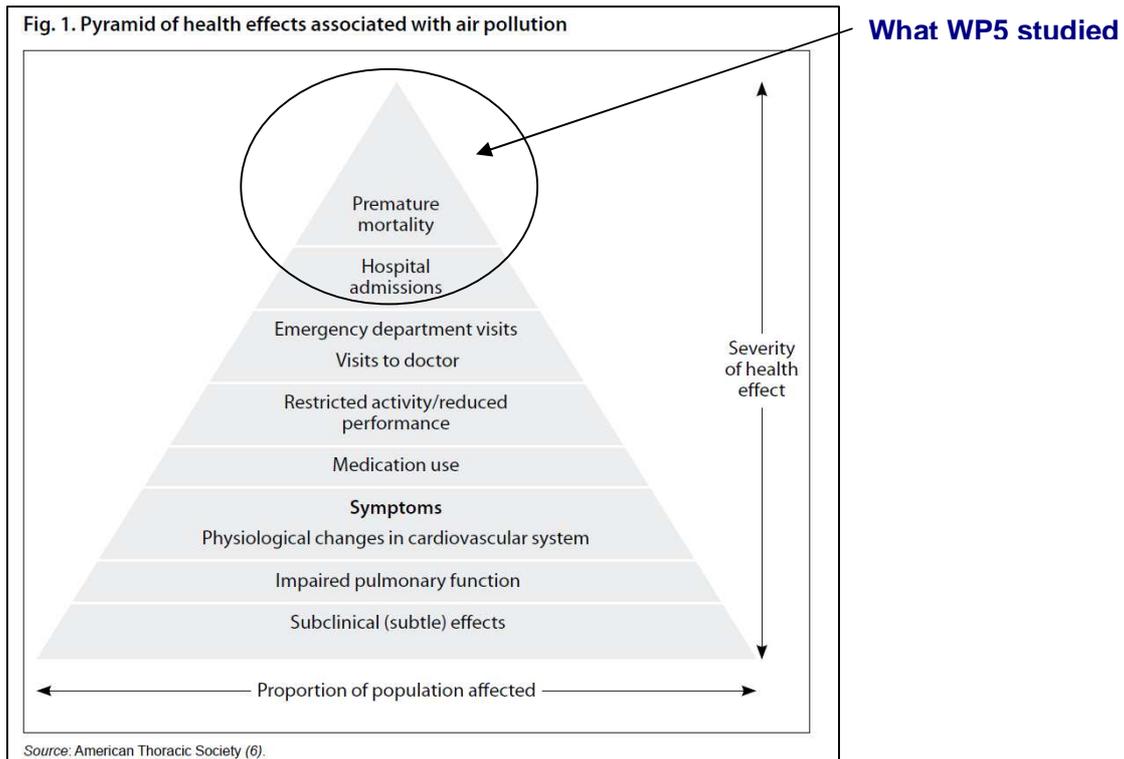
Hence, exceeding the WHO AQG on PM_{2.5} led to a burden on mortality of nearly 19,000 deaths per annum, more than 15,000 of which are caused by cardiovascular diseases.

Apekom also determined that the monetary health benefits if the WHO AQG for PM_{2.5} was complied within the 25 cities would total some €31.5 billion annually, including savings on health expenditures, absenteeism and intangible costs such as well-being, life expectancy and quality of life.

The impact on morbidity of short-term exposure to PM₁₀ was similarly investigated: in 22 cities exceeding the WHO AQG for PM₁₀, a decrease of annual PM₁₀ levels to 20 µg/m³ could lead to a reduction of more than 2,500 cardiac hospitalisations and of more than 5,300 respiratory hospitalisations annually.

We also analysed the short-term impact of ozone on morbidity and mortality. The proportion of days exceeding the WHO AQG of 100 µg/m³ of ozone (the daily 8-hour maximum level) varied from 1% to 30% (average, 12%) depending on the city. The findings showed that compliance with WHO-AQG could lead to the postponing of more than 200 annual deaths in the 25 Apekom cities and to a reduction of 150 respiratory hospitalisations annually in 22 Apekom cities.

All these results were produced in a standardised way and give a robust estimate for the health effects of air pollution in each of the 25 Aphekom cities. Yet WP5's findings are likely to underestimate the total impact of air pollution, as they only represent the tip of the iceberg (see figure below). However, Aphekom explored new avenues, such as WP4's work on the onset and exacerbations of chronic diseases and exposure to traffic in a set of Aphekom cities.



How can we make HIAs more meaningful and actionable for developing policies and recommendations on air pollution for urban populations?

Laura Perez, Nino Künzli – Centre for Research in Environmental Epidemiology, CREAL, Barcelona, Spain, Swiss Tropical and Public Health Institute and University of Basel, Switzerland

Olivier Chanel, National Centre for Scientific Research, GREQAM and IDEP, Marseille, France

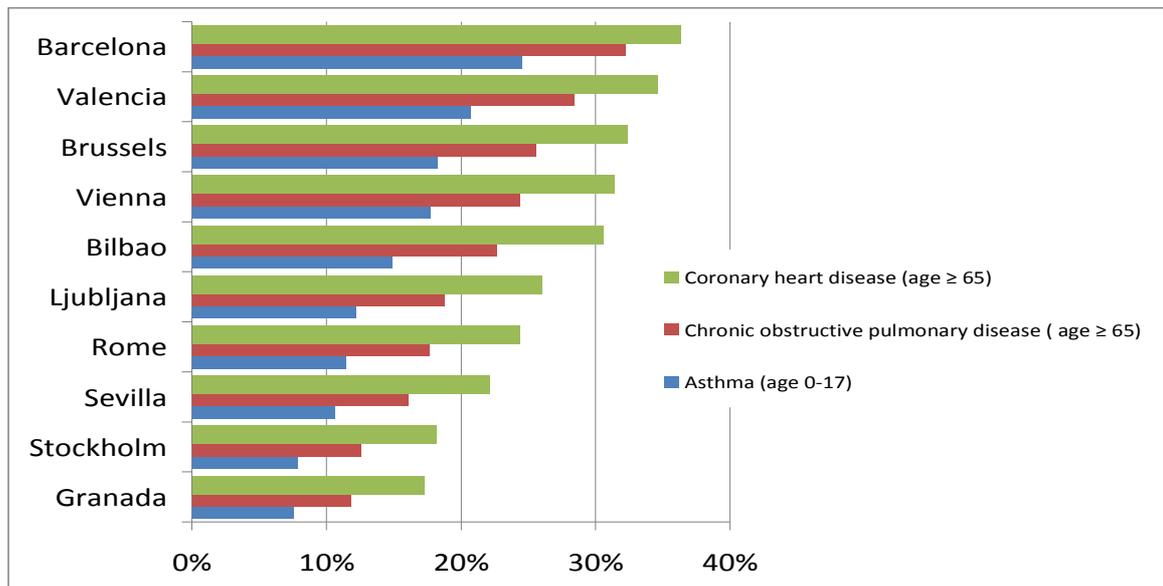
Pollutants such as ultrafine particles occur in high concentrations along streets and roads carrying large volumes of traffic. Evidence is growing that living near such streets and roads may have serious health effects, particularly on the development of chronic diseases. Aphekom's WP4 applied innovative HIA methods to take into account the additional long-term impact of living near busy roads in 10 Aphekom cities.

Busy roads were defined as those carrying more than 10,000 vehicles per day. It was determined that, on average, over 50 percent of the population in the 10 European cities

studied lives within 150 metres of such roads and could thus be exposed to substantial levels of toxic pollutants.

In the cities studied, our HIA showed that living near these roads could be responsible for some 15-30 percent of all new cases of asthma in children; and of COPD (chronic obstructive pulmonary disease) and CHD (coronary heart disease) in adults 65 years of age and older.

Percentage of population with chronic diseases whose disease is attributable to living near busv streets and roads in 10 Aphekom cities



WP4 further estimated that, on average for all 10 cities studied, 15-30 percent of exacerbations of asthma in children, acute worsening of COPD and acute CHD problems in adults are attributable to air pollution.

Exposure to local traffic-related pollution is very common in European cities and could create a large burden of chronic disease, which was not included in previous risk assessments.

The cost associated with new cases is significantly greater (€329 million) than the cost of exacerbating existing cases (€13.5 million).

The findings show that local traffic-related air pollution should be the subject of future policies aimed at better protecting public health.

Do policies designed to reduce air pollution and its health impacts really work? And what are the monetary benefits?

Patrick Goodman, Susan Henschel – Dublin Institute of Technology

Antonis Analitis - Department of Hygiene, Epidemiology and Medical Statistics, Medical School, University of Athens, Greece

Alain Le Tertre - French Institute for Public Health Surveillance, InVS, France

Richard Atkinson - St. George's, University of London, United Kingdom and

Ariana Zeka - Brunel University, London, United Kingdom

Olivier Chanel, National Centre for Scientific Research, GREQAM and IDEP, Marseille, France

Aphekom's WP6 reviewed the existing literature of air pollution intervention studies with the objective to identify different types of interventions and evaluation approaches looking at different health outcomes. It gives a summarized overview on a collection of most relevant, published intervention studies that assess the health impact of changes in air quality due to interventions. Some of these "interventions" are not interventions in the pure sense of the word, but may be unplanned side effects attributable to political, economic or other societal changes.

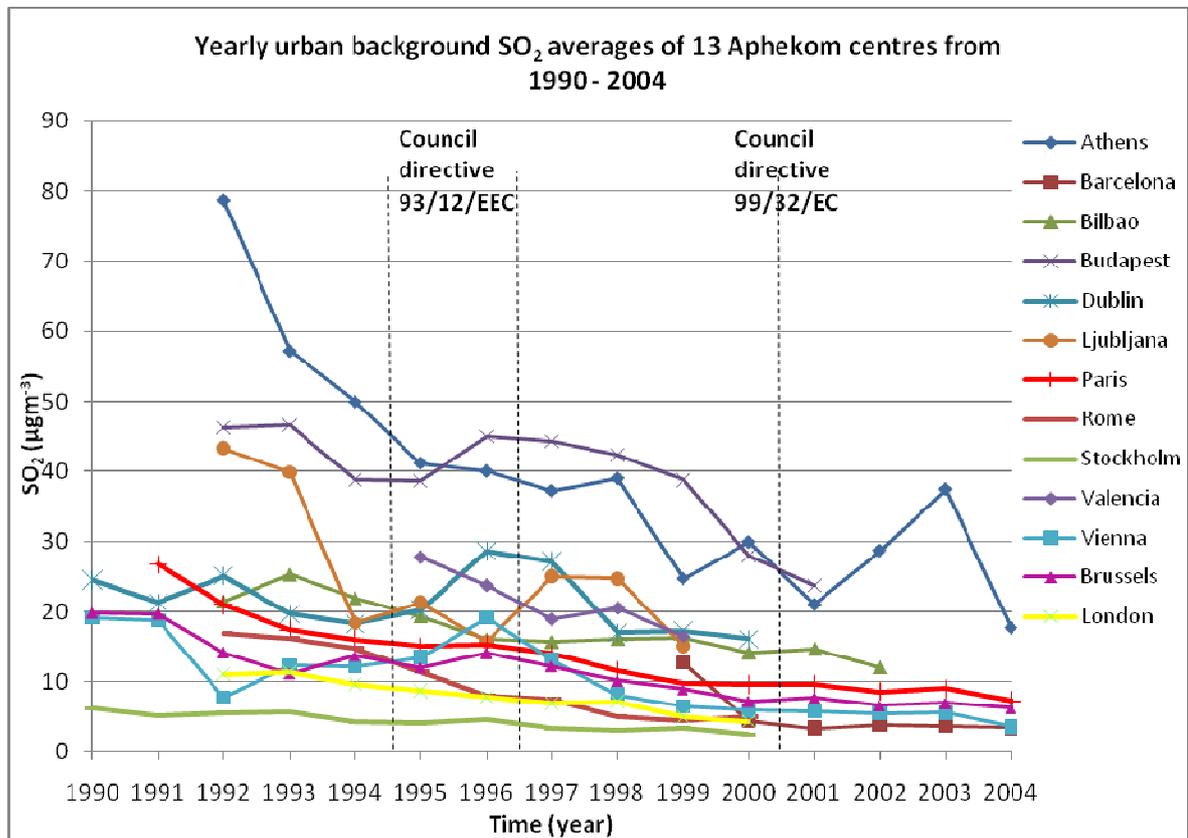
We observed that the findings from the studies and the methods used in the analysis are quite varied, and hence limit the scope to directly compare results from the different studies. Furthermore the opportunities to assess the full extend/all aspects of an intervention are not always given as this is dependent on available funding, data availability, etc. Overall this review showed that these various interventions irrespective of their nature have been successful at reducing air pollution levels. It has also shown that there is consistent published evidence that a number of these interventions have been associated with health benefits, mostly by way of reduced cardiovascular or respiratory mortality and or morbidity. In the majority of reviewed interventions the observed decrease in mortality exceeded the expected predicted figures which were based on observations from European multicity studies.

WP6 also analysed the health impacts and monetary costs of implementing the EU legislation (Council Directive 93/12/EEC and its amended version Council Directive 1999/32/EC including marine oils) designed to reduce the sulphur content of fuels (mainly diesel oil used by diesel vehicles and for shipping and home heating).

The air-quality data analysis showed a general downwards trend over the study period urban background SO₂ was observed. There was no clear step change in SO₂ concentrations after implementation of the Directives; rather a gradual decline in SO₂ levels was observed. For the 20 Aphekom cities studied, an overall drop of about 66% in ambient SO₂ levels was observed comparing to the time period prior to October 1994 to the time period after the year 2000.

The health data analysis showed no evidence of change of slope in the SO₂-mortality dose-response curve comparing the before and after implementation periods of the SO₂ Council Directives. Estimated mortality reduction was then only related to the drop in SO₂ levels.

Starting in the year 2000, the reductions in SO₂ levels prevented 2,212 deaths per year compared to the reference period prior to October 1994, valued at €191.6 million in terms of monetary costs.



These findings underscore the health and monetary benefits from drafting and implementing effective EU policies on air pollution and ensuring compliance with them over time.

How can we improve communication both among and between scientists and stakeholders concerned with the impact of air pollution on health?

Yorghos Remvikos – Centre of Economics and Ethics for the Environment and Development, C3ED, University of Versailles Saint-Quentin-en-Yvelines, UVSQ, France;

Catherine Boulard – Brussels Institute for the Management of the Environment, IBGE, Belgium

To help decision makers draft policies on air quality and related environmental-health issues, Aphekom’s WP7 has developed a process, based on a deliberation-support tool, that helps structure exchanges between stakeholders involved in developing policy options.

We will describe the successive steps in this process that we call “environmental learning” using the following example.

Let us assume that participants want to discuss a policy option such as the definition and implementation of a low-emission zone (LEZ), and a sustainability issue such as the economic development surrounding this policy option.

To avoid possible ambiguities, the issue is first formulated as a question, e.g., “Do the proposed policies favour economic development?” It is then broken down into subcategories and determinants that the participants have agreed on.

“Do the proposed policies favour economic development?”

Sub-category	Specific determinants
Wealth creation	Income/Economic development
	Distribution of wealth
	Benefits to the local or regional communities
	Technological developments (household/family; commercial; industrial; agricultural; infrastructures; and medical)
	Accessibility to infrastructures, services and resources
Employment opportunities	Creation (or destruction) of jobs
	Jobs available to local population
	Diversity of employment opportunities
Economic potential	For the population that works or lives nearby
	For tourism
	For business

In the next step each participant provides a judgment on the policy option (henceforth called the “performance issue”) through each sub-category and determinant; judgments use a colour scale (from red for complete disagreement to green for complete agreement).

In our example the question would now be, “Do you think the LEZ will favour economic development in the following subcategories and determinants?”

Performance issue	Subcategory	Specific determinants	Policy option: Low-emission zone (LEZ)			
			Participant 1	Participant 2	Participant 3	Participant 4
Economic development	Wealth creation	Distribution of wealth	Red	Yellow	Orange	Green
		Benefits to the local or regional communities	Yellow	Green	Green	Yellow
		Technological developments I)	Orange	White	Yellow	White
		Accessibility to infrastructures, services and resources	Yellow	Green	Green	Yellow
	Employment opportunities	Creation (or destruction) of jobs	Red	Green	Orange	Yellow
		Jobs available to local population	Red	Yellow	White	Orange
		Diversity of employment opportunities	Orange	White	Green	Yellow
	Economic potential	For the population that works or lives nearby	White	Red	Yellow	Orange
		For tourism	Yellow	Orange	White	Green
		For business	Orange	White	Green	Yellow

The final ranking table, shown below in a broader example, recapitulates the rankings provided by all the participants for LEZ and other policies.

Performance issue	sub-categories	Options																				
		Agrofuels						Types of vehicles						Low emission zones								
Equity and social aspects	Vulnerable or deprived sub groups	0	0	0	-1	0	0	0	0	1	0	1	-1	0	2	0	2	2	-1	-1	-1	1
	Equitable access to measures and services	0	0	-1	1	0	1	0	-1	1	2	1	-1	0	1	-1	-1	1	0	0	1	1
	Environmental justice	0	0	0	1	0	1	0	0	1	1	0	0	0	2	0	-1	2	NR	-1	1	1
	Distant consequences	-1	-1	-1	-1	-1	-1	-1	1	1	0	1	0	0	1	2	-1	0	NR	0	0	0
Economic development	Creation of wealth	1	0	1	1	1	2	1	1	2	0	1	2	0	2	1	2	0	1	0	1	1
	Job opportunities	1	1	1	1	1	2	1	1	2	0	1	2	1	2	1	2	0	0	0	1	1
	Economic attractivity	0	0	0	0	1	0	0	1	1	1	1	0	0	2	2	2	2	1	2	1	1
Health and quality of life	Impacts on living environments	0	0	-1	-1	-1	0	0	1	1	0	1	1	2	2	2	2	1	1	2	2	1
	Attractivity of the living environment	0	0	0	-1	0	0	0	1	2	2	0	1	1	2	2	2	2	1	2	2	1
	Individual aspects	0	-1	0	0	0	0	1	1	0	0	1	0	1	1	2	2	2	-1	2	2	2
Equilibrium of the environment	Direct impacts	0	-1	-1	0	0	1	0	1	0	2	1	0	1	2	2	1	1	1	2	2	2
	Indirect impacts	-1	-1	0	-1	-1	0	1	1	1	2	0	1	1	2	1	1	1	0	0	1	1
Institutional aspects	Incomplete responsibility	1	-1	1	-1	-1	-1	1	1	0	-1	0	-1	-1	1	2	2	2	0	0	2	1
	Strategies and political priorities	2	-1	1	-1	-1	1	1	2	0	0	0	0	1	1	2	-1	1	0	-1	1	1
	Implementation	2	NR	2	0	-1	1	1	2	0	NR	0	-1	1	1	2	2	2	NR	0	2	1

This type of multi-criteria assessment enables highlighting divergences of opinion, focusing discussions on critical points and bridging differences among stakeholders from differing backgrounds. As a result, this process facilitates both communication and decision-making.

Panel discussions

Panel 1. What are the value and implications of Aphekom's work?

Chair: Hanns Moshhammer – Medical University of Vienna, Austria

Panellists

Bertil Forsberg – Umea University, Sweden, and **Nino Künzli** – Swiss Tropical and Public Health Institute and University of Basel, Switzerland (Aphekom partners)

Patrick Kinney – Columbia University, United States (Aphekom Advisory Committee)

Brian Miller – Institute of Occupational Medicine, United Kingdom (Heimtsa Project)

Have Aphekom's findings advanced our understanding of the impacts of air pollution on health?

Patrick Kinney – Columbia University, United States (Aphekom Advisory Committee)

From an outside perspective from the U.S., Aphekom proposes findings based on an up-to-date application of the state of the art in health impact assessment (HIA) methods. In addition Aphekom is innovative in many ways: the novel methods developed by the project's scientists to take into account the contribution of traffic air pollution in the onset of chronic diseases are extremely interesting. Also, overall, the multifaceted aspects of this project, integrating health impacts, economic valuation, and involvement of decision-makers, are highly remarkable.

Yet, despite such accomplishments, one should remember that Aphekom is a small study, with limited time and budget. If we were to apply HIAs for more comprehensive geographical areas such as a whole country or all of Europe or if we wanted to analyse trends over time in HIAs and the attributable burden of diseases associated with air pollution, it would require time and budget. But Aphekom methods can be easily applied to different places and periods. It is thus important that this work goes on.

How useful will Aphekom's findings be on the local, national and European levels?

Bertil Forsberg – Umea University, Sweden (Aphekom co-manager)

So far, most HIAs are based on studies considering that the population in a city is homogeneously exposed to air pollution. Aphekom has brought a new generation of HIAs. In the future, HIAs of local interventions will build more on Aphekom-type HIAs that take into account proximity to traffic, and therefore investigate effects of the gradients of exposure within cities. Aphekom findings are also important for the burden on the health sector, and the health costs will be quite different if we include more morbidity and chronic diseases in air pollution HIAs.

What are the next priorities in terms of information, research and training on air pollution and health?

Nino Künzli – Swiss Tropical and Public Health Institute and University of Basel, Switzerland (Aphekom Work Package [WP] leader)

Future HIAs will have to be more integrative in the risk assessment framework in order to take into account chronic and acute effects of air pollution and, within cities, more local air pollution vs. background air pollution that led us in the past to underestimate the problem.

There is still a need to gain knowledge on the chronic effects of air pollution, i.e. we need large cohort studies in Europe. The European project Escape – based on existing cohort studies – is an important first step in that process, but new large and standardized cohorts are needed too.

Also there is a lot of evidence on the toxic effects of ultrafine particles (UFP), especially concerning the development of cardiovascular diseases through atherosclerosis. These are based on animal studies, and on fewer epidemiological studies, so we need more epidemiological studies to confirm the results in humans.

Acute effects of air pollution remain important to monitor how changes in air quality are accompanied by changes in health effects. It would be timely to launch an Aphea-3 type project investigating the possible evolution of the risk functions (CRFs) in EU cities in light of changes in car technology and fleets, air quality policies, and urban planning.

Regarding policy-making, we need to move toward measuring pollutants like UFP along highways, busy roads and street canyons, and to make them tangible for policy-makers to discuss a way to regulate them to improve health among people living along such roads.

Should research preempt action?

Brian Miller – Institute of Occupational Medicine, United Kingdom (Heimtsa Project and Aphekom Advisory Committee)

Research doesn't preempt action; it precedes action. Let's have a look at the history of research on air pollution. What we have learned from time series and cohort studies has been summarised in reviews that examine whether studies are consistent, and what generalised message we can take from them. Then if we believe those studies, and that the research results apply more widely, we see what's the current problem, what's the size of it.

We do burden calculations and then we can carry out HIAs to look at the future or possible futures that we may envisage. And we need to monitor what actually happens when policies are enacted, and see if our predictions are confirmed or not. So we have a

continuous cycle from research to action that moves on. Aphekom is a good example of that process.

We will never be able to answer all the questions that can be raised on air pollution, but we can make our methods transparent, and disseminate our tools so that others can use them to answer their own questions. And this is what Aphekom and other projects such as Heimtsa try to do. Aphekom also underlines that scientists need to work with policy-makers so they can make efficient use of the scientific results.

Questions and comments

Pat Goodman – Dublin Institute of Technology, Ireland (Aphekom WP leader)

How can we put ultrafine particles (UFPs) on the agenda? If we wait for the EU to put them on the agenda it may be too late, so the best approach is a dual approach: we need people in the research field to start measuring and reporting on ultrafine levels, and their associations with health effects, while at the same time lobbying at EU level to get UFPs on the agenda. Developments within the USEPA can also influence EU policy.

Nino Künzli

Science is now mature to discuss UFPs with policy makers. There is strong experimental evidence of their toxicity, and even some epidemiological studies support this evidence. In fact, proximity is a surrogate of exposure to ultrafine PM. We need measurements and monitoring in some hot spots on a regular basis.

Klea Katsouyanni – University of Athens, Greece

The chemical and physical aspects of particles, including UFP, should be investigated, but coarse particles have also shown an effect. Differences between anthropogenic and natural PM were not underlined by health scientists but by policy-makers, more likely as I see it to use that as an excuse for non-compliance with the EU air quality regulations.

From an epidemiological point of view, we need to investigate the different effects from the different chemical and physical compositions of particles. It is much quicker, easier and cheaper to investigate this question with short-term effects studies, but to do time-series studies we are missing appropriate measurements.

Also, in the last 25 years we, air pollution scientists, have been very active with good support from the EC. Now things are moving forward, and for me we are losing momentum to an extent, as the EC is interested in broader, holistic approaches. So we should take that into account and widen our air pollution studies to integrate other risks, not only climate change but also noise, in order to give a global picture of the health risks.

Panel 2. What are the past and future of national policies on reducing air pollution?

Chair: Yorghos Remvikos – UVSQ, France

Panelists

José Cambou – National Secretary of France Nature Environnement, France

Pascal Dupuis – Head Climate and Energy Efficiency, Ministry of Sustainable Development, France

Bela Kuslits – Scientific Advisor, Parliamentary Commissioner for Future Generations, Hungary

Liliana La Sala – Senior Medical Officer, Directorate General for Prevention, Ministry of Health, Italy

Anastasia Pantazopoulou – Director General of Public Health, Ministry of Health and Social Solidarity, Greece

Caroline Paul – Head Unit Outdoor Environment and Chemical Products, Ministry of Health, France

If your country regulates the transportation of goods in urban settings, has it measured the resulting health and monetary benefits, and what were they?

Pascal Dupuis – Head Climate and Energy Efficiency, Ministry of Sustainable Development, France

At the national level, the “Grenelle de l’Environnement” [Grenelle Environment Round Table] launched in 2007 has given us the opportunity to integrate different policies, including mitigation of climate change, energy savings and improvement of air quality. These policies are now being handled by a single department at the French Ministry of the Environment, involving about 200 people. Its primary objectives are to promote synergies between policies and avoid antagonisms. This will be operational at the regional level, with the development of regional plans for climate, air quality and energy (schémas régionaux air climat énergie). Giving the main role to regions is a first in France.

One objective of Grenelle is to reduce PM_{2.5} concentrations by 30% in 2015. A national plan has been drafted (“Plan particule”) that describes measures for different sectors.

There is no specific action dedicated to the transport of goods in cities. This will have to be discussed at the regional level.

The national plan also involves experimental low-emission zones with vehicle travel restrictions (zones d’action prioritaires pour l’air, Zapa). It is estimated that creation of these zones should decrease emissions of PM by about 10 kilo tonnes, representing a reduction of 10% of the objective. Unfortunately, the associated costs are not known.

With that said, for us today’s striking Aphek results are the gain in life expectancy shown and the associated economic benefits. Decision-making is limited by many

constraints, the main one being economic. The only way to promote new public policies is to base them on economic numbers that can be accepted by all stakeholders.

Yet, because of their non-compliance with EU regulations, countries will soon face fines that may motivate them to draft new policies.

What are the three main results of Aphekom that provide arguments for your NGO?

José Cambou – National Secretary of France Nature Environnement, France

Aphekom's findings are indeed very interesting. First, we know that urban centres are attracting more and more people, so it is important to study air pollution in urban settings. Aphekom's findings on proximity to traffic provide arguments that promote greater use of public transportation, and an improvement in the transport of goods. For instance, the use of electric vehicles would be very helpful to reduce both noise and air pollution. Tackling air pollution related to the transport of goods also means that we need to think of a broader reorganization of the logistics of goods transportation.

Aphekom also raises the question of inequalities of exposures in urban populations, and that policies should not just favour the richest populations.

The economic valuation done by Aphekom will give data to counter economic arguments stating that reducing air pollution is too expensive for society.

Aphekom's findings need to be included in the regional plans on air pollution, climate, energy and transportation, (schémas régionaux air climat énergie, plan de protection de l'atmosphère, plan de déplacements urbains), as well as when planning new infrastructure.

It is very important that the findings be made public. They should be presented in simple ways, easily accessible, and translated into the different EU languages. More than transparency, we would also appreciate sincerity so that we really know where there is consensus among scientists, but also where there are points of disagreement. Finally, it is essential to involve civil society in the development of projects and plans to reduce air pollution.

How do you plan to shift policies based on pollution peaks to policies based on the long-term effects of air pollution?

Anastasia Pantazopoulou – Director General of Public Health, Ministry of Health and Social Solidarity, Greece

First of all, it's very interesting to participate in this meeting, which brings together stakeholders, NGOs, researchers, universities and ministries talking about matters that concern all of us.

In Greece, the Ministry of Environment, Energy and Climate Change is responsible for setting air quality standards. For the next two years, the Ministry of Health and Social Solidarity has defined three priorities for actions: promote policies for healthier life styles, reduce predominant diseases, and protect people from health threats. The above comprise our main goals for this time period.

Specifically for the first goal, there will be a program on health education at primary and secondary schools; the development of a health map of the country to identify the health status of our citizens, as well as the quality of the health services provided to them when they seek it. Our main concerns for controlling risk factors include smoking, nutrition, obesity and physical activity, accidents, alcohol consumption, etc. For the second goal, national plans focus mainly on reducing the incidence of the two first causes of death: cancer and cardiovascular diseases. For the third goal, other actions concerning strengthening of health structures will be implemented.

In terms of environmental health, we know that the benefits of prevention are greater than the treatment costs for the diseases caused by environmental pollution. As I can see from the presentation of the Aphekom project, it provides a useful tool for civil servants to present appropriate information to politicians to allow them to adopt more effective policies.

Bela Kuslits – Scientific Advisor, Parliamentary Commissioner for Future Generations, Hungary

Our role is to bridge the gap between scientists and policy-makers in Hungary, organising conferences for example to explain how important air pollution is.

Budapest is one of the most polluted cities in the Aphekom project. There are two main sources of air pollution in Budapest: traffic and associated traffic jams; and heating. In the next few years, the government plans to introduce a traffic tax in order to reduce traffic. Heating is a big concern from using coal but also waste and waste plastic, as people cannot afford better sources of energy. In fact, in Eastern Europe environmental issues are largely linked with social issues that need to be addressed.

Also when there is a smog alert, half of the cars are banned in Budapest on alternate days (license plates with odd numbers and then even numbers). Other policies are being studied to limit the environmental impact of air pollution.

In each of your countries, what are the three main initiatives your ministry will take to reduce the impact of air pollution on health and when will it take them?

Liliana La Sala – Senior Medical Officer, Directorate General for Prevention, Ministry of Health, Italy

First of all, we really need to fill the gap between science and policy decisions. In Italy, responsibilities are shared; and initiatives on air pollution are the responsibility of the

regional and local levels. The regional level prepares air-quality plans, and the local level is responsible for implementing measures, which up to now have essentially concerned traffic limitations, industries and energy production.

At the national level, the Ministry of the Environment is in charge of setting the rules, and the Ministry of Health acts as an adviser. A national plan to reduce air pollution has been set up and should be approved in the coming weeks, with a focus on traffic (types of vehicles, fuels, etc.), industry and agriculture, even because Italy must respond to a European violation on PM10.

In this context, I want to say how important are the results provided by Aphekom today. We need to keep attention alive on air pollution, because there is always the risk that the objectives are not fulfilled.

Caroline Paul – Head Unit Outdoor Environment and Chemical products, Ministry of Health, France

This meeting shows how important it is to find opportunities like the ones offered by Aphekom and InVS today for exchanges between scientists, policymakers and other stakeholders. We really need data like that produced by Aphekom to negotiate actions, policies, limit values etc.

Today, France is engaging in a new strategy with a large focus on the regional level. Therefore, the Ministry of Health has to develop guidelines to help the new regional health agencies, which will be responsible for developing and implementing all the regional plans involving air pollution.

The exchange, communication and dissemination of results are all very important. I remember that, when we negotiated the limit values for particles together with the Ministry of the Environment several years ago, other ministries were not aware of the health risks associated with air pollution. Today we work in close collaboration with the Ministry of Transportation on these topics, and also on evaluating potential health impacts when designing new large transportation infrastructure.

The Ministry of Health also takes initiatives, for example on the health impacts of pollens. And in coordination with other health plans, we promote policies for better air quality that can produce gains in health and well-being, such as those for alternative transportation, healthy mobility and physical activity.

Finally, we need to think differently about cities, urban spaces and travel, and reverse the balance between the space given to motor vehicles and that given to pedestrians in urban areas. And we need to communicate more about the health risks of air pollution.

Panel 3. What results have local and regional policies achieved in reducing air pollution?

Chair: Catherine Bouland – IBGE, Belgium

Panelists

Simon Birkett – Founder and Director of Clean Air in London

Karine Léger – Deputy Director, Airparif, Paris Air Pollution Network

Renaud Martin – Chief of Staff of Denis Baupin, Deputy Mayor in Charge of the Environment, Sustainable Development and the Paris Climate Protection Plan, Paris City Council

Niklas Ricklund – Programme Coordinator, Environmental Assessment Department/Monitoring Unit, Swedish Environmental Protection Agency, Sweden

In your city, do you know the proportion of total trips individuals make using public transportation? Using private motor vehicles? Have these proportions changed with local policies such as congestion charges, public bike share and bike lanes?

Simon Birkett – Founder and Director of Clean Air in London

In 2009 in London, in terms of trips 33% were made by public transport, 41% by private cars, 24% by walking and less than 2% by cycling. There is a growing demand for road transport: between 1993 and 2008, the number of trip journeys per day increased dramatically (+24%). This included an increase of 12% between 2000 and 2008. This growth in demand has put heavy pressure on road infrastructure.

London observed a shift of 5% from private cars to public transportation between 2000 and 2008, with a slowdown in 2009. The economic crisis has been associated with a slight decrease in the shift to more sustainable transport and a fall of 0.4% in the absolute number of journeys per day (i.e. 2009 relative to 2008).

Our new mayor is now favouring cars with a policy called “traffic smoothing”. For example, he has reduced the crossing time for pedestrians, delayed phase 3 of the implementation of the low-emission zone (LEZ) and removed the Western Extension of the congestion charge. The last of these steps will encourage some 30,000 vehicles per day to return to west London for the first time in three years.

These economic and political pressures are working against the need to reduce transport emissions to protect public health. In London for example, some 80% of PM2.5 emissions are caused by road transport, so we really need to reduce that source.

Today, there are about 5,000 public-hire bicycles in London. Sixty percent of the users have switched from public transportation to bicycles, so the scheme has not been efficient in terms of reducing the use of cars.

The LEZ in London includes rich and poor neighbourhoods. However, poorer people tend to live along the busy roads, which exacerbate health inequalities. Phases 1 and 2 of the LEZ were associated with larger decreases in emissions than in concentrations of PM and NO₂, but with very significant reductions in black carbon.

Finally, in London we have 13 schools located within 150 metres and a total of 75 schools within 400 metres of roads carrying more than 100,000 vehicles per day, so Aphekom's results on exposure to traffic worry me.

What goals and policies have you set for changing this proportion in the next 5 years?

Renaud Martin – Chief of Staff of Denis Baupin, Deputy Mayor in charge of Environment, Sustainable Development and the Paris Climate Protection Plan, Paris City Council

First, I would like to tell you that the health and monetary benefits Aphekom has shown this morning are very important for us, as they help raise awareness of air pollution among citizens. We have to work together to discuss the most acceptable measures to protect health effectively.

In Paris, policies to reduce the use of private cars and to reorganize public space have been implemented since 2001. Since then, Paris has observed a drop in the use of private cars by 25% with a decrease in the number of car owners in the city. The use of public transportation has increased by 17%. Also the use of bike lanes has greatly increased, although cycling still represents only 3% of travel. In the future, roads by the river (voies sur berge) will be closed to motor vehicles, and the tramway network will be extended.

Airparif (Paris air-pollution monitoring network) has made measurements to assess the impact of these policies and has reported decreases in emissions.

Paris will also campaign for becoming a low-emission zone (zone d'action prioritaire pour l'air, Zapa) in a ring including areas around Paris reaching the A86 highway. This project will also include actions to reduce greenhouse gases.

Have you seen an improvement in air quality both in general and near streets and roads from increased use of alternate means of transportation?

Karine Léger – Deputy Director, Airparif, Paris Air Pollution Network

Between 2002 and 2007, we observed a decrease of emissions in Paris of 32%, 80% of which resulted from replacing old vehicles with new ones that comply with greatly tightened Euro standards, which is a major factor in improving air quality. We are waiting for the Euro 6 standards, which will allow reducing NO₂ and particles.

In terms of concentrations, the improvements have been smaller. On 140 kilometres of roads we observed decreases in NO₂ concentrations. And on 40 kilometres of these roads

where important changes have been made, with separate bike lanes, bus lanes and tram lines, the decrease reached 10 µg/m³, which is quite large.

However, due to traffic transfer, on the rest of the streets for 20 kilometres of roads there was no improvement or even an increase in NO₂ concentrations. And NO₂ levels in Paris do not comply with the EU directives and remain high along most of the road network. In fact, Paris is rather small compared with the greater Paris area, where background levels of air pollution remain quite high. As mentioned earlier, to see a significant decrease in NO₂ levels, policy measures should include this greater Paris area, and also be aimed at other sources of NO₂, not just traffic.

Changes in vehicle traffic described for Paris benefit not only those living near busy roads but also pedestrians and cyclists. The benefits are not only in terms of health but also well-being, noise and CO₂ emissions. These changes led to a decrease of 11% in CO₂ emissions.

Regarding the work presented today, for us it is very important that our work help better assess the exposure to air pollution of populations wherever they are, and especially when travelling where levels are high and where people spend a lot of time in the Paris area. Comprehensive assessments of the effects on health could then be performed for different environments where people spend time every day.

Lastly, we encourage greater collaboration between our monitoring community and health experts over the long term.

Niklas Ricklund – Programme Coordinator, Environmental Assessment Department/Monitoring Unit, Swedish Environmental Protection Agency, Sweden

In Stockholm there are several activities going on to reduce levels of air pollutants. For instance we have public bikes, congestion taxes, etc. In roads with congestion taxes we observed decreases of 10% for NO_x and 15% for CO.

Swedish travelling administration and trade organisations have set up a project to increase the number of journeys made by public transport by a factor of two before 2020. The goal will be achieved through actions intended to create good conditions to motivate the use of public transport, like good infrastructure, urban planning, tax issues and legislation.

More on the local level, clean cars have been promoted in Stockholm and other cities since 1994. The initiatives have been pretty successful so far: in 2008 every third new vehicle bought by a person in Stockholm was an alternative fuel vehicle (every fourth car in the whole country), and the fleet of cars and buses owned by the city of Stockholm should all run on bio fuel before the end of 2011.

Aphekoms findings regarding proximity to traffic are valuable to Sweden, for instance since we have schools along busy roads.

Panel 4. Are environmental and public-health policy and action moving forward in Europe?

Chair: Klea Katsouyanni – University of Athens, Greece

Panelists

Natacha Grenier – Policy Officer Unit C4 – Health Determinants, European Commission's Directorate General for Health and Consumers (DG SANCO)

Paloma Martin – Scientific Project Officer, Executive Agency for Health and Consumers (EAHC)

Emile de Saeger – Scientific Officer Unit C3 – Industrial Emissions, European Commission's Directorate General for the Environment (DG ENV)

Anne Stauffer – Policy Manager, Health and Environment Alliance (HEAL)

Peter van den Hazel – Environmental Health Specialist, European Public Health Association (EUPHA)

How can the information Aphekom has produced be used at the policy level?

Natacha Grenier – Policy Officer Unit C4 – Health Determinants, European Commission's Directorate General for Health and Consumers (DG SANCO)

First, we share today for the first time the main findings of the Aphekom project, and it is always a special time for all of us.

I would like to make a general comment on the use of the project's findings at a policy level. Once the findings have been published, we can use them to help defining the priorities in the following call for proposals of the Health Programme. On a daily basis, when answering questions from the European Parliament for example, we can rely on this type of findings to provide concrete answers and sources. Also, we need to share these findings among the different directorates of the European Commission in order to use them in other relevant policy areas, such as transportation.

The dissemination of the findings is very important. It can be done through the DG SANCO Web site and the Health-EU portal, through experts' reports and conferences, workshops, etc. The EAHC plays an important role in bringing these findings to policy officers at DG SANCO so we can pass them on for stimulating internal discussions.

Finally, I am personally impressed by the figures shown this morning, particularly on the health and monetary benefits of reducing air pollution. Cost figures are also very important when discussing policies.

In 3 years how do you feel policy on reducing air pollution in Europe will have changed?

Emile de Saeger – Scientific Officer Unit C3 – Industrial Emissions, European Commission’s Directorate General for the Environment (DG ENV)

Aphekom confirms that air pollution creates a large public health burden in Europe, and this is consistent with the latest state of the environment report published by the EEA. Yet, in many places it is difficult to comply with the limit values for ozone, PM and NO_x. EU complaints will be issued against countries not complying with the regulation, with large economical and political costs. The Commission hopes that this will trigger more ambitious policies.

The EU Thematic Strategy on Air Pollution has induced important changes in the transport, energy and climate-change policies. What is very important is that 2013 has been elected as “the year of the air quality”. We are now preparing the revision of the AQ policy.

In the first phase in 2011, we will review the state of implementation of the current directives. In the second phase in 2012, we will switch to the revision of policies (three directives). One of the main activities coordinated by WHO will be to revisit the scientific evidence on the health effects of air pollution, which will also incorporate the Aphekom findings presented this morning.

This process will also give lot of space to stakeholders. And DG Environment should also make a proposal for regulating ultrafine particles, which so far is not considered by the AQ legislation.

What new or missing information is needed to improve EU legislation on air pollution?

Anne Stauffer – Policy Manager, Health and Environment Alliance (HEAL)

As a network of over 65 member organisations working for better health through a healthier environment, one of HEAL’s core tasks is to bring scientific evidence to policy makers at the European level.

I was very interested in the morbidity findings and in the fact reported this morning that we may have underestimated the health impacts of air pollution from busy roads. Aphekom provides us with an analysis of the health and monetary benefits of reducing air pollution. This cost-benefit analysis is very important as it shows that reducing air pollution helps strengthen the economy; it is not a question of environment and health vs. economy.

We hope that this message will especially be heard in the discussions on the Europe 2020 strategy, which gives overarching strategic direction for the EU in the next years, and puts an emphasis on a healthy and productive workforce.

It is important to integrate Aphekom's findings into many EU policies, into the upcoming review of the EU outdoor air quality policy and Europe 2020 strategy, but also the Healthy Ageing Initiative by DG SANCO to show that measures reducing air pollution will contribute to a longer and better life.

The EU white paper on transport will be published in two weeks, and it is very important to see how air pollution will be recognised and what kinds of measures are envisioned to change our ways of transport to bring down air pollution.

The EU Commission has just announced a major review of the EU's outdoor air quality policy and designated 2013 as the "Year of Air". With this review we are at a crossroads in Europe: we hope that it will see ambitious proposals to further reduce the environmental burden of disease from air pollution, not lead to a weakening of existing standards, which are still higher than WHO recommended limits.

HEAL hopes that the EU air quality review will be a process that will bring together scientists, experts from the health and medical community, policy-makers at the national and EU levels, and representatives of environment and health ministries to ensure that policy decisions will lead to better health for all of us.

How do you suggest preventing policies on climate change from having negative effects on reducing air pollution in Europe? Which actions have been most effective in reducing air pollution?

Peter van den Hazel – Environmental Health Specialist, European Public Health Association (EUPHA)

Climate-change mitigation strategies can be highly beneficial to air pollution, e.g. green zones can reduce both urban heat islands and air pollution. We should also be aware of possible drawbacks, especially linked to agro fuels or to CO₂ capture techniques. Low-emission zones are a good option, but we must be careful not to shift air pollution from one location to other locations.

In the public health sector, what we do see is that a shift in the activities of public health workers toward climate change will reduce their ability to address air pollution issues. And there will be a big burden on the public health sector in that sense.

Regarding actions that have proven effective, another European project, Pronet, on traffic, transport and health effects has shown that policy measures can be beneficial. Improved car technologies is one, and it should be made more mandatory in Europe, like in Asia; also the observed improved combustion techniques in large industries in Western Europe.

Another underestimated action is the benefits that we can win by changing fuel consumption, and combustion by shipping, e.g., air pollution has been reduced substantially in some seaports in Europe by making the ships use electric power when they are in harbour and not use their own dirty fuels.

Finally, in Pronet we observed that many measures are being undertaken, but they are poor in evaluating the effects. We usually believe that if we reduce exposure, every measure will be beneficial for health, but we shouldn't take this always for granted. We need more studies on the positive health effects of these policies.

Paloma Martin – Scientific Project Officer, Executive Agency for Health and Consumers (EAHC)

I want to make a final comment on Aphekom, and I want to say bravo Aphekom, because it has been very well managed with a really good and solid partnership with the right ingredients. And if possible, I would like to present you as a candidate for the best-practice project of the year at the Public health programme meeting this fall!

Questions and comments

Anastasia Pantazopoulou I am very interested in the communication issues developed by the project. Please share with us more details on the deliberation support tool developed in Aphekom and how we can benefit from it.

Klea Katsouyanni An extensive example of the use of the deliberation tool should be made available at the end of the project on the Aphekom Web site.

Nino Künzli A question to DG ENV: what are the chances during the next round of the discussion about PM2.5 and PM10 standards in Europe to obtain standards that are in line with science? Is it likely that the EU will adopt the WHO guidelines soon?

Emile de Saeger Ambition levels for PM will be rediscussed. It has been difficult to negotiate those levels in the past, but now the new scientific evidence will be an essential contribution to the revision of the ambition level of the EC. And I'm sure Aphekom will be asked to make a presentation in one of the stakeholder groups.

We do consider revising the target value to make it more binding for example, but also to extend the exposure indicators to other pollutants such as NO2 and other PM indicators like nanoparticles, number of particles and not only size. We also would like to move from indicators to the real culprits, for instance the chemical species responsible for the observed effects; this would be a more cost-benefit approach.

Patrick Goodman I notice that in London and Paris the price of public transportation has been increasing, and I think this is counterproductive if we try to encourage people to use public transport. We should reduce the price of public transportation and increase the cost of using private vehicles.

Yorghos Remvikos Just to mention that the U.S. regulated PM2.5 based on the science produced in 1997. It took 11 years for Europe to really tackle that problem. And still we refuse to create a daily standard for PM2.5, which is the most stringent AQ regulation in

the U.S. I don't understand why the same scientific data is understood differently in the U.S. and in Europe.

Concluding remarks by Dr. Françoise Weber, Executive Director of InVS

First I would like to thank all of you for your presence here. As director of the InVS, the French Institute for Public Health Surveillance, I am very proud that my agency is hosting this meeting, which is a sort of crowning achievement of a project in which it has been heavily involved for years.

In fact Aphekom was the natural and necessary continuation of the Apheis surveillance program, which was born here in Saint Maurice at the beginning of the 1990s following our participation in the Apehea research project. Professor Klea Katsouyanni, who is with us today, coordinated Apehea and is also contributing to the Aphekom project.

Already at that time, my predecessors were convinced that we were facing one of the main threats to public health for the years to come. What we have since learned has proven them right.

The limit values decreed by European directives on air quality are today still being exceeded, and the levels of ambient-air particles continue to be harmful for the health of our fellow citizens.

The Aphekom project has been co-funded by the European Commission's Programme on Community Action in the Field of Public Health for the years 2003- 2008, and by the many national and local institutions that have dedicated resources to fulfilling this project. I want to thank all of you for your commitment to the project and for the resources you have brought to bear in making it such a success.

The project's findings are highly relevant for decision makers, not just for those responsible for public health but also for those who work on urban planning, for local bodies and for industry.

Besides showing the impact air pollution has on health, you have translated this impact into numbers of human lives, and shown that effective regulation of air pollution produces major health and monetary benefits. Your findings also show where it is important to act now, in specific to regulate air pollution near heavy traffic.

As participants and stakeholders in this project, today you have shared not only these findings but also the rich experience that has emerged from this project.

I know that today's discussions have been both animated and productive, and that you have identified many steps for moving forward now when the project is drawing to a close.

Given the current economic situation at InVS, it is unlikely that we will be able to coordinate a new Aphekom for the time being. But my agency will continue to contribute actively to European undertakings on the impact of air pollution on health.

I am personally committed to keeping alive the Aphekom network, which brings together experts in environmental and public health working at institutions like ours in some 15 European countries. And I call on our European counterparts to do the same.

This network offers an outstanding potential for accomplishing the mission of public health that is ours here at InVS and at our counterpart institutions across Europe. This mission calls for constantly keeping decision makers up to date on changes in public-health situations and their impacts, and when needed issuing alerts so that the necessary steps are taken.

At InVS we are convinced the findings you have released and discussed today will enable us all to better accomplish this critical mission, and advance the cause of public health in general.

In closing, I want to thank all the institutions and, above all, the men and women who have worked on this project, with special thanks to all the work-package leaders and to their close collaborators you have heard from this morning. With outstanding professionalism, you have made a major contribution to the field of public health.

Let us now continue to work together, perhaps in new ways, until this source of sickness and suffering that is air pollution can be brought under control.

Thank you very much!