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Questions and Answers on the Thematic Strategy on air pollution

What is the issue?

Air pollution is caused by the emission to the atmosphere of certain substances which, alone or through chemical reaction, can damage human health and/or the environment.

Air pollution is both a local and a transboundary problem as emissions from one country can travel large distances in the atmosphere and cause adverse effects in other countries.

The single pollutants causing most damage to eco-systems, human health and materials are nitrogen oxides (NO_x), sulphur dioxide (SO₂), ammonia (NH₃), ground level ozone and airborne fine dust, known as particulate matter (PM). Ground-level ozone and particulate matter are the pollutants that cause most damage to human health. Ozone is not emitted directly but is formed through the reaction of volatile organic compounds (VOCs) and nitrogen oxides in the presence of sunshine. Fine dust can be emitted directly to the air (primary particles) or can be formed in the atmosphere by certain gases (secondary particles) such as sulphur dioxide, nitrogen oxides and ammonia.

What harmful impacts does air pollution have?

- **Human health.** Air pollution has impacts on human health ranging from minor effects on the respiratory system to reduced lung function, asthma, chronic bronchitis) and reduced life expectancy.
- **Acidification.** Acid deposits (caused by emissions of SO₂, NO_x and ammonia) damage forests, rivers, lakes and other ecosystems as well as materials such as buildings and historical sites.
- **Eutrophication.** Eutrophication is an excess input of nitrogen nutrients (nitrogen oxides and ammonia) which disturbs the structure and function of land-based and aquatic ecosystems. Excess nitrogen in terrestrial ecosystems can lead to a loss of biodiversity and nitrogen leaching into water courses.
- **Material damage.** Buildings, including historical sites, are damaged by acidification and particulates.

What is the EU already doing about air pollution?

Various EU laws regulate air pollution:

*Air Quality Framework Directive and its four Daughter Directives.*¹ These laws set concentration limit values or target values for a range of pollutants in the air: sulphur dioxide, nitrogen oxides, particulate matter (PM₁₀), carbon monoxide, ozone, benzene, lead, and polyaromatic hydrocarbons. There are also requirements to monitor a number of air pollutants. If monitoring shows that these values are exceeded, Member States are required to set up, implement and report on abatement plans. This set of laws was developed progressively in response to the emerging scientific knowledge. Some of the limit values have already entered into force (for example those on particulate matter) whilst some will only come into effect in 2010 (e.g. nitrogen dioxide).

*National Emissions Ceiling Directive.*² This sets national emission ceilings for sulphur dioxide, nitrogen oxides, ammonia and volatile organic compounds. These have to be achieved by 2010 through EU wide and national measures. The ceilings are reviewed periodically, with the next review foreseen for 2006.

Sectoral emission laws. There are several EU laws controlling emissions from different sources, for instance vehicles (EURO I-IV) and non-road machinery, large combustion plants and industrial processes (the Integrated Pollution Prevention and Control Directive), the use of solvents and solvent-containing products and the sulphur content of liquid fuels.

What do Europe's citizens think about air pollution?

Air pollution is high on the list of European citizens' environmental concerns. In a recent Eurobarometer survey 45% of those polled said they were worried about air pollution. The same proportion saw the EU as the level most suited to finding solutions to environmental problems. Another recent Eurobarometer poll, on the Lisbon agenda, showed that a large majority (64%) of the public consider environmental protection an incentive for innovation and not an obstacle to economic performance.

What is a Thematic Strategy?

The Sixth Environmental Action Programme (6EAP), which was adopted by the European Parliament and Council in 2002 and runs until 2012, requires the Commission to prepare Thematic Strategies covering seven areas: air pollution, the

¹ Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (framework directive)

Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (1st daughter directive)

Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air (2nd daughter directive)

Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air (3rd daughter directive)

Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (4th daughter directive)

² Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants

marine environment, waste prevention and recycling, sustainable use of resources, soils, pesticides and the urban environment.

The Thematic Strategies represent the next generation of environment policy, taking a medium-term perspective to around 2020. As their name suggests they work with themes, rather than with specific pollutants or economic activities as has been the case in the past. The strategies set clear environmental objectives, for instance in terms of air quality, and, on this basis, seek to identify the most appropriate instruments to achieve these objectives.

Each strategy is founded on thorough research and science, and follows an in-depth review of existing policy and wide-ranging stakeholder consultation. The aim has been to create positive synergies between the seven strategies, as well as to integrate them with existing sectoral policies, the Lisbon Strategy and the Sustainable Development Strategy. Each Thematic Strategy will thus help achieve the long-term goal of environmental sustainability while contributing to the Lisbon goals of enhancing growth and employment and promoting eco-innovation.

The strategies are also an exercise in Better Regulation, simplifying and clarifying legislation where it already exists and proposing light framework legislation where new laws are deemed necessary.

Why is a Thematic Strategy on air pollution needed?

Air pollution in the EU, notably from fine particulate matter and ground-level ozone, presently causes the premature death of almost 370,000 citizens every year and reduces average life expectancy by an average of 9 months. In the most polluted areas, the loss of life expectancy may be up to two years. Altogether, air pollution robs Europe's population of 3.6 million years of life annually, as well as causing increased hospital admissions and medical costs. The human health damage that air pollution causes is estimated to cost the European economy between € 427 and 790 billion per year³.

On top of this, air pollution has a significant environmental impact through the damage it causes to crops and ecosystems that support life, such as forests and fresh water bodies. While no agreed methodology exists yet for quantifying the cost of this damage in monetary terms, it is clear that it is substantial.

Air pollution does not stop at national borders and therefore needs to be tackled at European level and indeed through international cooperation at hemispheric level as well.

Action taken at EU, national and international levels to reduce air pollution since the 1970s has steadily improved the general situation, but even if all current policies are fully implemented, particulate matter and ground-level ozone will still be causing 290,000 premature deaths a year in 2020. This equates to the loss of 2.47 million life years. The monetised cost of this damage to human health is estimated at €189-609 billion per annum in 2020. Damage to ecosystems will also remain considerable.

This human and environmental toll is unacceptable. Additional measures are therefore needed to reduce air pollution further in cost-effective ways.

The need for further action was recognised in the EU's Sixth Environmental Action Programme (6EAP). The 6EAP sets the ambitious objective of attaining "levels of air quality that do not give rise to significant negative impacts on and risks to human

³ See

http://europa.eu.int/comm/environment/air/cafe/activities/cba_baseline_results2000_2020.pdf

health and the environment.” The Programme requires the Commission to propose a Thematic Strategy on air pollution this year.

What does the Strategy aim to achieve?

Analysis done under the Commission’s Clean Air for Europe (CAFE) stakeholder programme, set up in 2001, has concluded that it will not be possible to fully reach the 6EAP’s objective by 2020 of addressing all significant health and environmental impacts of air pollution, even if all measures to improve air quality that are technically possible were taken with no regard to their cost. As an important step towards achieving the 6EAP objective in the longer term, the Strategy thus sets specific interim objectives for reducing air pollution impacts by 2020. On the basis of careful analysis, these interim objectives have been chosen from a range of possible options because they offer the best balance between benefits and costs. The Strategy has a specific focus on reducing human exposure to particulate matter, which is a major health hazard.

The Strategy will also simplify and streamline current air quality legislation, thus contributing to Better Regulation, by combining all existing instruments in a single, consolidated Ambient Air Quality Directive. These changes will make it easier for Member States to implement the legislation, and therefore make it more effective.

What benefits will the Strategy bring, and how much will it cost?

The Strategy aims to provide the most cost-effective solution for reaching the interim objectives chosen. This would bring major benefits for human health and the environment worth tens of billions of euros in annual cost savings to the EU economy, plus potential benefits for EU competitiveness through the development of innovative cleaner technologies.

The health benefits alone of the Strategy are valued at between €42 and 135 billion per year,⁴ or between 0.30% and 1.0% of EU-25 GDP in 2020. Premature deaths due to particulate matter would be reduced by 63,000 in 2020 compared with the business as usual situation. This is equivalent to saving 560,000 life years per year. Lower income groups are expected to benefit more as they are generally exposed to higher levels of air pollution than those in higher income groups.

There is no agreed methodology for expressing environmental benefits in monetary terms, but they would be substantial. The forest area affected by acidification in 2020 would be halved compared with the business as usual scenario and the total area of ecosystems affected by eutrophication reduced by 27%.

There would also be benefits in other environmental areas. There are synergies between air pollution policy and climate change policy, and reductions in air pollution lead to improvements in soil and water quality.

The cost of the Strategy is estimated at €7.1 billion annually in 2020. This is equivalent to approximately 0.05% of EU-25 GDP in 2020, and is **more than five times below** the lowest projected value of the Strategy’s health benefits alone.

Will there be a cost if we take no action?

⁴ There are two distinct ways to calculate the damage to the economy caused by premature mortality. The lower figure is based on the median of the value of a life year lost (VOLY) while the higher figure is based on the mean value of a statistical life (VSL).

Yes, and a heavy one. Taking no action means our economies would bear greater costs from impaired human health and higher environmental damage than would be the case with the Strategy. The cost would be 42-135 billion euros per year by 2020 in foregone health benefits alone. This is without counting the environmental damage to hundreds of thousands of square kilometres of forests and other ecosystems.

How can we be sure about these cost and benefit calculations?

A comprehensive impact assessment has been prepared both of the Strategy and of an accompanying proposal to consolidate EU air quality legislation in a single directive. It is based on the best available science and economics. Both the cost-effectiveness methodologies and the cost-benefit methodologies were peer-reviewed independently.

On the benefits side, the most cautious methods for estimating health benefits have been used. Due to the lack of an agreed methodology, environmental benefits have not been monetised and do not appear in the benefit figures.

How will the Strategy affect EU competitiveness?

Pursuing the interim objectives of the Strategy is not expected to affect Europe's competitiveness relative to other industrialised countries, such as the USA and Japan, as these countries have similar or more stringent air pollution policies in place.

Indeed, further reducing damage to human health and the environment could help improve the EU's competitiveness. It can be expected to stimulate innovation in less-polluting and more resource-efficient technologies. By focusing research and development on such technologies the EU can secure a strong competitive position since other countries will eventually need to adopt them too.

It is clear that China, South Korea and some other developing countries are increasingly concerned about air pollution and are looking for policy and technical inspiration from Europe. For instance both Korea and China have adopted the "Euro III" vehicle emission standards developed by the EU and are planning to adopt the "Euro IV" standards just a couple of years later than the EU itself.

The costs of the strategy are not expected to have any impact on net employment. Production lost through ill health would be reduced since improvements in air quality improve the health of employees too. This means a slight increase in labour force participation, which is one of the aims of the Lisbon Strategy.

Which pollutants does the Strategy address?

The Strategy focuses on reducing emissions of five primary air pollutants plus ground-level ozone, a secondary pollutant, whose impacts on human health and/or the environment need to be further controlled.

Particulate matter. 'Primary' particulates are emitted directly into the atmosphere from certain processes. 'Secondary' particulates are emissions of pollutants, such as sulphur dioxide (SO₂), nitrogen oxides (NO_x) and ammonia (NH₃), which are altered through chemical reaction in the atmosphere and add to the mass of particulates. PM₁₀ refers to particulates with a diameter of less than 10 micrometers, comprising the 'coarse' fraction. PM_{2.5} refers to those with a diameter of less than 2.5 micrometers, comprising the 'fine' fraction. Fine particulates are strongly correlated with harmful effects on human health as they can penetrate into sensitive areas of the lungs. There is insufficient evidence to determine a safe level of human exposure to particulates and in practical terms all increases in PM levels should be regarded as harmful.

Ground-level ozone. This secondary pollutant is formed when NO_x and volatile organic compounds (VOCs) react chemically in the presence of sunlight, thus making it most prevalent in summer and in southern Europe. In contrast to the ozone layer in the stratosphere which protects us from harmful ultraviolet radiation, ozone at ground level is harmful both to human health and ecosystems. Human exposure to ozone is associated with acute mortality as well as non-fatal effects on lung function. There is insufficient evidence to determine a safe level of exposure to ozone. Regarding the environment, ozone damage is the most serious regional air pollution problem affecting forests, vegetation and agricultural crops in Europe.

Ammonia (NH₃). This gas is emitted mainly from animal wastes and following the application of fertilisers to agricultural land. It contributes to acid deposition, eutrophication, the formation of secondary particulates and human health impacts.

Nitrogen oxides (NO_x). These comprise the gases nitric oxide (NO) and nitrogen dioxide (NO₂). NO is formed predominantly in high temperature combustion processes and can subsequently be converted to NO₂ in the atmosphere. NO_x contributes to acid deposition, eutrophication, the formation of ground-level ozone and human health impacts.

Sulphur dioxide (SO₂). This gas is formed from the combustion of fuels containing sulphur, such as coal and oil. Sulphur dioxide contributes to acid deposition and harms human health.

Volatile organic compounds (VOCs). Volatile carbon-based chemical compounds are emitted to the atmosphere from natural sources and from human activities, such as the use of solvents, paints and varnishes, the storage of transport fuels and their use at filling stations, and car exhaust emissions. VOCs are a key component in the formation of ground-level ozone.

Current air quality legislation also covers benzene, carbon monoxide, polycyclic aromatic hydrocarbons and the heavy metals arsenic, cadmium, mercury and nickel. Most of these pollutants have been regulated very recently and no further action to reduce their emissions is proposed for the time being.

Will air quality standards be relaxed under the proposed new Directive?

No. on the contrary, the air Strategy implies a very significant improvement in air standards. The World Health Organisation and the Commission's own Scientific Committee on Health and Environmental Risk have recommended on health grounds that air quality standards should not be relaxed. In addition, their latest evidence has strongly suggested that the smallest of the fine particulates (PM_{2.5}) need to be regulated. This is why the Strategy and the accompanying proposal to revise the Ambient Air Quality Directive would for the first time introduce controls on human exposure to PM_{2.5} to complement the existing limits on coarse particulate matter (PM₁₀). There is strong evidence that fine particles are more hazardous to human health than larger ones.

The proposed approach would establish a concentration cap for PM_{2.5} in ambient air in the most polluted areas at a level that would prevent unduly high risks to the population. This would be coupled with an obligation on Member States to reduce average human exposure to urban background levels of PM_{2.5} over the period 2010-2020. As far as possible, they would have to aim for a 20% reduction.

The proposal also envisages more comprehensive monitoring of certain pollutants, including PM_{2.5}. This will permit a greater understanding of this pollutant and make possible policy improvements in future.

Are any changes foreseen to the implementation of the air quality legislation?

The Commission will continue to disseminate best practice when it comes to implementing the ambient air quality legislation. This means that the Commission will continue to host workshops and develop guidance for the Member States. The Commission will also pursue infringement proceedings against Member States where legislation is not correctly implemented in accordance with the Treaty.

However, the proposed revision of the air quality legislation will address some implementation problems. One of them is the achievement of certain limit values. The proposal foresees that where Member States have taken all reasonable measures to achieve compliance but have been unable to achieve it in specific areas, they could be allowed extra time to reach compliance provided that a plan is developed to ensure compliance by the later date.

The proposal for a new Ambient Air Quality Directive makes clear that the Commission will discount pollution from natural sources for compliance purposes. This means that where pollution arises from natural sources such as wind-blown Saharan sand or sea spray, these will not count towards exceedences of limit values since there is no way to control such natural contributions.

Which sectors will be affected?

Different economic sectors make different contributions to air pollution and thus also to the solutions envisaged under the Strategy, which address the following sectors and emissions:

Agriculture (arable and livestock): ammonia emissions

Transport (road, shipping, aviation): particulate matter, volatile organic compounds, nitrogen oxides, sulphur dioxide

Industry (road vehicle manufacturing, fuel production and conversion, filling stations, makers and operators of small combustion plants): nitrogen oxides, particulates, volatile organic compounds, sulphur dioxide.

What other actions are foreseen under the Strategy?

A range of other actions involving various sectors will need to be taken to reach the Strategy's interim objectives:

National Emission Ceilings Directive (NECD): The Commission intends to propose revised national emissions ceilings in line with the interim objectives of the Strategy.

Energy:

Small combustion plants: This increasingly important emissions source is at present not regulated at Community level. The Commission will examine whether the Integrated Pollution Prevention and Control (IPPC) Directive⁵ should be expanded to cover combustion sources below 50 MW_{th}. Harmonised technical standards will be developed for domestic combustion appliances and their fuels. If feasible, smaller

⁵ Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control

residential and commercial buildings could be included in an extended directive on energy efficiency.

VOC emissions from fuel stations: Given the role of VOCs in the formation of ground-level ozone, the Commission will examine the scope for reducing VOC emissions from vehicle refuelling at filling stations.

Transport:

Road vehicle emissions: Proposals for further tightening emission limits for new cars and vans, and separately for heavy duty vehicles, will be issued by the Commission this year.

Aviation: Measures with potential synergies between air quality and climate change will be discussed in a forthcoming Communication on the use of economic instruments to reduce aviation's contribution to climate change.

Shipping: Emissions to air of SO₂ and NO_x from ships are a serious concern as they are expected to exceed those of land-based sources in the EU by 2020. The Commission has developed an EU strategy on ship emissions and a directive on sulphur in marine fuel has been agreed. In the International Maritime Organisation, the Commission will propose to strengthen current air emission standards. In the absence of an agreement in the IMO, the EU will consider adopting its own standards.

Agriculture: Cattle farming, the pig and poultry sector and mineral fertilisers account for the vast majority of ammonia emissions. While recent reform of the Common Agricultural Policy (CAP) should bring about some reduction in emissions, these improvements may prove insufficient to meet the objectives of the Strategy. Priority will be given to measures and policies which reduce "excessive" nitrogen use in agriculture and which simultaneously address nitrates in water as well as ammonia and nitrous oxide emissions to air. Such policies could address the nitrogen content of animal feedstuffs and excessive use of nitrogen fertilisers

Structural Funds: The Structural Funds are co-financing many measures in the Member States and regions that contribute to improved air quality. The Commission's proposal for the reform of the cohesion policy for 2007-2013 includes proposals that will help meet the objectives of the air pollution Strategy. Examples are support for sustainable transport systems, sustainable and cleaner energy supplies and the rehabilitation and reuse of derelict land.

International cooperation: As the regional and global background contribution to European air pollution grows, the Community must work on building an international consensus around the importance of hemispheric pollution. In cooperation with the Member States, the Commission will lead jointly with the USA a new task force on hemispheric air pollution under the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP).

What is the timetable for implementation of the Strategy?

The Strategy will be implemented over the next several years.

The proposal for a streamlined Ambient Air Quality Directive will be communicated immediately to the other institutions and will be examined by them under the co-decision procedure. This usually takes around two years.

A new proposal to reduce pollutant emissions from new cars and vans is expected later in 2005, and a proposal to tackle emissions from heavy duty engines used in trucks and buses is expected to follow later.

The review of the National Emissions Ceilings Directive is under way and the Commission is expected to issue a proposal in mid to late 2006. The review of the Integrated Pollution Prevention and Control Directive will also take place in 2006 and will look at incorporating smaller combustion plants as well as looking at possible further measures to control pollution from intensive livestock industries.

Further analytical work on ship emissions will be undertaken with a view to submitting proposals to the IMO in 2006.

The Strategy will be reviewed at periodic intervals, with the first review due to take place in five years. The results will feed into the review of the 6EAP.

Will the Strategy contribute to the Better Regulation initiative?

Yes. As mentioned, the Strategy offers an excellent opportunity to make Better Regulation a reality by consolidating all existing EU air quality legislation in a single directive. This will clarify and simplify ambiguous provisions, repeal those which have become obsolete and modernise and reduce reporting requirements, thus lightening the administrative burden on Member States. Due to this consolidation, the new Ambient Air Quality Directive will be considerably lighter, with 32 articles instead of 67 now and 17 annexes instead of 32. This will make the legislation clearer and easier to understand and to implement in Member States.

Has the Commission consulted widely on the Strategy?

Broad stakeholder participation has been a watchword of the process throughout. The Strategy has been developed under the Clean Air for Europe (CAFE) programme, which the Commission set up in 2001 to develop, collect and validate scientific information about air pollution with the aim of reviewing current policies and assessing progress towards long-term objectives.

The CAFE Steering Group has provided the main forum for stakeholder participation. The Steering Group brings together representatives of the EU Member States, the World Health Organisation, several industry sectors – energy production, petroleum, industries with emissions of volatile organic compounds (VOCs), the automotive sector and general industry⁶ -, environmental NGOs⁷, European Economic Area countries, the European Environment Agency, the Joint Research Centre and the CLRTAP. The Steering Group has met 14 times since the CAFE programme started. Altogether more than 100 stakeholder meetings have been held during the CAFE programme.

Furthermore, a two-month public consultation on the objectives and content of the Strategy was conducted on the internet in December 2004 and January 2005. This generated 11,578 responses, over 10,000 of which came from private individuals. Respondents indicated an increased desire for protection from air pollution, a willingness to pay for reduced risks and a clear need for better public information.

How can we be sure the Strategy has a sound scientific basis?

⁶ Industrial associations or companies involved include UNICE, EURELECTRIC, CEFIC, CONCAWE, EUROPIA, ACEA, EUROMETAUX, CEMBUREAU and COPA.

⁷ Environmental NGOs involved have included the European Environmental Bureau (EEB), the Swedish NGO Secretariat on Acid Rain and the European Federation for Transport and Environment.

An overriding principle of the CAFE programme has been to ensure that analyses are conducted on the basis of the best available information.

The World Health Organisation provided its best information on the impacts of air pollutants on health. The WHO's systematic review of air pollution health aspects in Europe collected the most recent information from health impact research, evaluated this and held meetings with nationally nominated experts to reach consensus on the conclusions. Industrial organisations also nominated experts to take part in the process.

Concerning environmental damage, the latest information from the scientific centres of the Convention on Long-Range Transboundary Air Pollution was used.

The main analytical tools used – the RAINS integrated assessment model and the cost-benefit methodology – were both subject to independent peer-review before being used to develop and analyse policy scenarios.

Full details of the Strategy are available at

<http://europa.eu.int/comm/environment/air/cafe/index.htm>

See also IP/05/