

**WORKSHOP ON NON-BINDING ASPIRATIONAL TARGETS
FOR AIR POLLUTION FOR THE YEAR 2050**

Informal report by the Chair of the Task Force on Integrated Assessment Modelling

INTRODUCTION

1. The workshop on non-binding aspirational targets for air pollution for the year 2050 was organised by the Task Force on Integrated Assessment Modelling of the Convention on Long-range Transboundary Air Pollution and the ACCENT, the Atmospheric Composition Change European Network of Excellence.
2. Participants were from Austria, Belgium, the Czech Republic, Denmark, European Commission, Finland, France, Germany, Ireland, Italy, Macedonia, the Netherlands, Norway, Portugal, Serbia, the Slovak Republic, Sweden and the United Kingdom of Great Britain and Northern Ireland.
3. Several bodies under the Convention participated: the Expert Group on Techno-economic Issues, the Coordination Centre for Effects (CCE), the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), the Centre for Integrated Assessment Modelling (CIAM), the Integrated Cooperative Programmes on Materials and on Vegetation, the Task Force on Health, the Working Group on Effects, the Task Force on reactive Nitrogen and the Task Force on Emission inventories and Projections.
4. Also the European Environment Agency (EEA), the Oil Companies' European Organization for Environment, Health and Safety (CONCAWE), the European Commission's Joint Research Centre (JRC) and the European Environmental Bureau (EEB) participated and a member of the UNECE secretariat attended.
5. Mr. J. Sliggers (Executive Body and Working Group on Strategies) requested the participants to facilitate the policy process that should define how we would like the environment and health status to look like in 2050. Furthermore he suggested making full use of the linkages with climate policy and nitrogen policy.

I. TARGET-SETTING FOR RELEVANT EFFECTS

6. Mr. T. Johannessen, chair of the Working Group on Effects, concluded that the Working Group on Effects was able to contribute to the target setting because it has no-effect levels and dose-response functions available for all main receptors, as well as the monitoring data for verification.
7. Mr. J.-P. Hettelingh (CCE) recommended to choose aspirational impact targets as the starting point and to derive from that the required exposure and deposition reductions, emission reductions and abatement measures. Impact targets should protect biodiversity and ecosystem services for human well-being. Impact targets could be based on critical loads or on target loads that are aimed at recovery of ecosystems in a target year, making use of dynamic modelling. Full recovery in 2050 would require much more reduction in emissions than meeting the critical loads in 2050.
8. Ms. G. Mills (ICP Vegetation) recommended the generic flux methods for crops and forest trees to be used in integrated assessment modelling. In order to avoid significant ozone damage reductions in the generic flux of ozone of around 75% would be required across large areas of Europe. Avoiding exceedance of the health related SOMO35-indicator is not sufficient to protect vegetation in all of Europe. In Northern and Western Europe further reductions of ozone concentrations would be required.

9. Mr. G. Hoek (Task Force on Health) recommended using the WHO Air Quality Guidelines as aspirational targets. In order to increase the robustness of particulate matter policy emphasis would not only be based on PM_{2.5} mass, but also on other aspects that might show to be important in future with possible emerging new evidence from science. E.g. reduction of black carbon emissions could become important as it has been shown to have toxicological effects and because it also increases climate change. Ultrafine particles could become more important for local air quality policy.

10. S. Doytchinov (ICP Materials) concluded that tolerable levels for the protection of cultural heritage and infrastructure would require more reduction of sulphur than needed for the protection of ecosystems and health. Additional reductions of up to 80% would be needed in urban areas.

11. The workshop concluded that targets for impact indicators should be as specific as possible and linked to a date (e.g. not more than x months of loss in life expectancy by 2050), but that there was also a need for an overarching vision to energize the choice of ambitions for different impact indicators. A long term vision could either be based on the current aims of the Gothenburg Protocol (no adverse effects for man and environment), but also be combined with a vision on society: e.g. a post fossil fuel era or an energy- and transport system without emissions.

II. EMISSION REDUCTION REQUIREMENTS TO MEET TARGETS

12. Mr. M. Posch (CCE) illustrated what ranges of emission reductions would be needed in Europe to attain critical loads and target loads, using the latest critical load data and ecosystem-specific deposition rates. In order to meet such targets significant additional reductions in emission and deposition levels would be required: 40-60% for sulphur in central and Northern Europe and 70-90% for nitrogen across most of Europe. The required reductions go beyond the margin within which the source-receptor model could produce reliable conclusions. Remaining acidification problems would be of more local nature, for which also measures like liming can be cost-effective. Eutrophication and ozone probably remain Europe-wide problems requiring not only end-of-pipe measures but also structural and behavioural changes. Without technological innovations the costs of such extreme control measures may be prohibitive.

III. CO-BENEFITS FROM CLIMATE CHANGE MITIGATION

13. Mr. E. Dame (European Commission) concluded that the long-term climate target (not more than two degree temperature rise) would require 80-95% reduction of CO₂-emissions in the EU by 2050, which is possible with existing technology. Quick action is required as risks and impacts are accumulating, and later remedies would be significantly more costly. The non binding interim target of 40-55% CO₂-reduction can be partly be implemented via the use of emission credits outside the EU.

14. Ms. S. Rao (IIASA) concluded on the basis of scenario's developed for the IPCC that there is a strong relation between emission reductions of CO₂ and of air pollutants. Most prominently this is the case with SO₂ and to a lesser extent with NO_x. The use of (1st generation) biomass and the application of carbon capture and storage would not reduce NO_x-emissions or could even lead to an increase.

15. Mr. P. Rafaj (IIASA) showed that all long-term energy scenarios, even those with increasing GHG emissions, show declining emissions of air pollutants. Energy intensity improvements have been the major driver for both historic (1970-2010) and future emission changes (baseline 2010-2050). Control technologies have also been important for air pollution emissions, especially for NO_x. Climate policy will not reverse this trend. CO₂-mitigation will further decrease SO₂, especially in the power sector.

16. Mr. D. van Vuuren (Netherlands) presented what technologies are available to implement the lowest possible emission scenario used in IPCC-reports. The choices of technological options in the power sector (nuclear, renewable sources and carbon capture and storage) depend on the development of future coal prices and the ambition level to mitigate climate change. Within the transport sector hydrogen-, biofuel- and electric cars are competing options. With the most ambitious climate policy scenario SO₂ emissions could be reduced by about 80% between 2010 and 2050. Emission reductions of NO_x would be around 60%, which is less than needed to meet the critical loads or target loads for eutrophication by 2050.

17. Ms. R. van Dingenen (JRC) concluded that a cut in CO₂-emissions will lead to a significant improvement in health impacts in all continents. As CO₂-emissions and SO₂-emissions are closely related, even climate policy will lead to a temporary net increase in radiative forcing in the next decades. Reduction of emissions of black carbon and ozone precursors could partly offset this effect. A combined climate and air pollution strategy shows the best result for both health impacts and radiative forcing.

18. Mr. H. Eerens (Netherlands) concluded from a study at the request of the OECD that local health benefits might trigger measures that are also beneficial to mitigate climate change, but that air pollution policy alone would not be sufficient to meet climate targets. On the other hand also climate policy alone is insufficient to meet air quality targets. Air pollution and climate change should not be considered in isolation, as either one of them makes it easier and significantly cheaper to reach the goals of the other.

19. Mr. O. Oenema (Netherlands) concluded that for NH₃ a reduction of emissions by 35% is technically feasible, but that some of the measures could lead to more emission of NO₃ and N₂O emissions. An approach without pollutant swapping would give 20-30% reduction of emissions of NH₃ and N₂O. These percentages are modest compared to the 70-90% emission reduction that would be required to meet the critical loads or target loads for eutrophication. Behavioural changes (diets with less meat) are not yet included in these maximum feasible reduction percentages.

IV. REDUCTION POSSIBILITIES

20. National presentations confirmed the findings of the international scenario analyses. Mr. M. Barrett illustrated how 80% CO₂-reduction between 1990 and 2050 could be implemented in the UK. National and urban emissions of most fossil fuel related pollutants will be decreased to low levels as well as the concomitant concentrations. Time is too short to insulate all houses in the UK before 2050. Also the emissions from aviation and international shipping could hardly be reduced. Aspirational targets would help in preventing a lock-in to specific solutions in energy use that might later hinder further development. An integrated view over a period of years would show that later action would require steeper reductions in the future.

21. Mr M. Barrett presented also on behalf of Mr. J. Lumbreras a long term energy scenario for Spain. As in other national scenarios due to the turnover rate of the capital stock only modest emission reductions can be realised before 2020 even with an ambitious climate policy. In this scenario the sharpest fall in emissions occurs between 2020 and 2040.

22. Ms. N. Allemand presented plans to reduce CO₂ emissions in France by 75% by 2050. For PM_{2.5} the reduction target is 30% in 2015. Ms. S. Schucht illustrated the indispensability of behavioural changes to implement the plan for the transport sector. Spatial planning and investments in public transport are important preconditions. Long term social support is crucial for behavioural change.

23. Mr. J. Ros (Netherlands) showed the interdependence of actions needed to change towards a zero-emissions transport system. Because many actors are involved it is important to invest in a shared long term vision to enable shorter term actions and investments (e.g. in R&D and infrastructure) in a meaningful and

coherent manner. A long term vision doesn't mean that actions can be delayed. On the contrary: the future starts today!

V. CONCLUSIONS AND RECOMMENDATIONS

24. A long term policy should start from a well-defined policy objective that sets the direction, e.g. 'sustainability', 'recovery', 'a combustion-free economy'. Quantitative aspirational targets should be effect-based, aiming at a high ambition level, but taking into account technological and economic possibilities. They can be based on risk management principles. Aspirational targets should be coupled with a date, as to enable the development of a road map towards the target, while maintaining enough flexibility because of all kind of surprises the future might entail. Targets for 2020 should fit into this road map and not create a lock-in situation in unsustainable solutions.

25. Both climate policy and air pollution policy should be developed without negative effects for other environmental issues, taking into account all relevant reactions in the atmosphere. Air pollution policy could profit from an ambitious climate policy. The use of biomass and carbon capture and storage requires clear objectives on air quality as to avoid a lock-in in potentially harmful solutions. Air pollution policy could potentially lead to more global warming in the next decades. Emission reductions of black carbon and ozone precursors can play an important role in off setting the negative climate effects of air pollution at the short term.

26. A combined strategy for climate and air pollution policy could create significant reductions of sulphur emissions. Climate policy will not be sufficient to solve local air pollution problems. Also problems related to reactive nitrogen emission will remain a huge challenge for air pollution policy as these will not be addressed by climate policy.

27. There are a number of policy decisions to be taken:

(a) Do we need quantitative national targets for 2050 or will the aspirational target be expressed for Europe as a whole or all parties to the Protocol together?

(b) Do we need intermediate – non binding - targets for 2030? The reason might be that between 2020 and 2030 significant steps could be possible if we act now.

(c) How do we define 'recovery of ecosystems'? Should we even protect the most sensitive ecosystem? Should we focus on nature areas that are of European wide value (such as the Natura2000 areas?

(d) Ecosystems are not affected by air pollution alone, how can ensure to protect ecosystems that will not be damaged by climate change, land use changes or forestry policy?

(e) How can we improve the coherence with abatement measures for methane and N₂O? Methane is not only a greenhouse gas, it is also a precursor for ozone formation.

28. Thinking about long term targets proved to be inspiring to the participants. It is recommended that other bodies under the Convention are invited to develop ideas on a long-term vision and consider aspirational and interim targets.

29. The Working Group on Strategies and Review is recommended to consider ways to include a long term vision, long term policy objectives and non-binding targets in a protocol.
