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Climate and Air Pollution

- future challenges for the Nordic countries in relation to the Convention on Long-Range Transboundary Air Pollution and the EU

- Summary of discussion at the NMR-HLG workshop 9-10 October, 2008, Oslo, Norway

Peringe Grennfelt and Øystein Hov

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Nordic co-operation

Nordic cooperation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and three autonomous areas: the Faroe Islands, Greenland, and Åland.

Nordic cooperation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

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Content

Foreword

The Air and Sea Group under Nordic Council of Ministers (HLG-NMR) has for several decades actively supported the work within the Convention on Long-Range Transport of Air Pollution (CLRTAP), and has several times contributed to the development of concepts and approaches that have turned out to be very useful in the development of air pollution abatement policies within the framework of CLRTAP.

HLG-NMR has promoted the development of scientific and policy tools including atmospheric transport and deposition models, and the development of concepts such as Critical Loads, Gap Closure and the Multi-pollutant Multi-effect approach. This has also been important as a basis for corresponding activities in the European Union.

The Air and Sea Group realizes that there is an ongoing need to further support the Convention and the Commission, in particular in the view of the importance of the interdependencies between air pollution and climate change.

The workshop on future strategies held in Oslo 9-10 October 2008 had the overall aim to consider further pathways for the Convention as well as for the international collaboration in general and the role of the Nordic countries in this work. At the workshop the future development of the regional air pollution issues were discussed in view of new findings and the links to climate change. The workshop concluded that there is increasing evidence that air pollution in many regions significantly influences climate change and that climate change will influence the occurrence and effects of atmospheric pollutants.

This report compiles the main findings and recommendations.

The invitation to the workshop, the programme and the list of participants are provided in the Annex. The presentations at the workshop can be found at http://www.emep.int/NMR_08/web_okt.html.

Background

Trends in European pollutant emissions

European air quality has undergone a remarkably improvement over the last 25 years. European sulphur dioxide emissions have decrease by more than 79% since 1980 when the SO_2 emissions peaked in the EU27 countries at a total of 39.3 million tonnes as sulphur. In 2005 these emissions were reduced to approximately 8.3 million tonnes. The European emissions are now at the levels typical for the end of the 19th century. The emissions of SO_2 are expected to be further reduced as a consequence of decisions already made, and expected to be approximately 2.9 million tonnes as SO_2 in 2020 (Amann et al. 2008). This is less than 8% of the 1980 emissions level. The outcome of the air pollution policy on sulphur dioxide has been very successful and the reductions in almost all countries are much larger than those foreseen when the Gothenburg Protocol was signed ten years ago.

In Europe, more specific within the EU27 domain, the emissions of nitrogen oxides have gone down from 17.1 million tonnes as NO_2 in 1990 to 11.3 million tonnes in 2005 or by approx. 35% since 1990. The implementation of current legislation will lead to a further emission reduction to a level expected to be approximately 7.7 million tonnes as NO_2 by 2020.

Ammonia emissions have also decreased since 1990, and the projections point at a further decrease up to 2020. Emissions in EU27 were in 1990 approx. 5.1 million tonnes as NH_3 and will according to the CAFE baseline scenario decrease to 3.1 million tonnes by 2020. By 2006 the emissions were approximately 80% of the 1990 level, the main decrease has taken place during the restructuring in Eastern Europe after 1990.

In the Thematic Strategy on Air Pollution European Commission proposed further reductions to be brought in through the revision of the NEC directive: for nitrogen oxides with an additional 0.5 million tonnes down to 5.2 million tonnes and for ammonia with additional 0.6 million tonnes down to 3.1 million tonnes.

In the process to revise the Gothenburg Protocol, the Working Group on Strategies and Review is discussing the options. Such options should include, inter alia, the addition of particulate matter (PM), the implications of developments in other forums, including co-benefits and potential trade-offs of climate change policies, and the introduction of flexibility to promote ratifications by countries of Eastern Europe, Caucasus and Central Asia (EECCA) and South-Eastern Europe (SEE). (See http://www.unece.org/env/

documents/2009/EB/wg5/wgsr44/ece.eb.air.wg.5.2009.4.e.pdf.) (See also Comment 1.)

CLRTAP development

The strategies and regulations to reduce air pollution emissions build on a long term development of the understanding of pollutant cycles and their effects on climate, ecosystems, human health and materials. The understanding evolves from the combined insight gained from the scientific understanding of atmospheric dynamics, physics and chemistry; the emission inventories and scenarios showing possible developments into the future, estimates of the cost to reduce emissions as a function of technology/source category, and the mapping of ecosystem sensitivities, the human populations and ecosystems at risk. In particular notable is the development of a comprehensive system for the monitoring of atmospheric composition and deposition, advanced atmospheric transport models and the development and application of integrated assessment models which permits the estimation of how to achieve environmental targets in a cost effective way.

Traditionally, long range transport of acidifying compounds and of ground level ozone has been the focus for European air pollution policies. Over the last years new aspects have become more important for the strategies. These include human health effects from particles, intercontinental transport and atmospheric pollutants affecting the entire Northern Hemisphere, the integrated approach of nitrogen and also the linkages between air pollution and climate change (both ways).

Particles, intercontinental transport and reactive nitrogen are all addressed by the Convention through inclusion in strategies and through the establishment of particular processes. The larger scale is addressed through the Task Force on Hemispheric Transport of Air Pollution (TFHTAP) and nitrogen through the Task Force on Reactive Nitrogen (TFRN). Climate change has, however, so far not received the same attention. It was a main topic for the so called Saltsjöbaden 3 conference[1], at which it was recognized that there are many interrelations to be assessed in future strategies, and that there are important co-benefits and tradeoffs in linking air pollution and climate change strategies.

[1] http://asta.ivl.se/Workshops/Saltsjobaden3/Conclusions/Salt3_Final_conclusions_rev8juni.pdf

Main workshop conclusions

The Nordic countries

- Should continue their support of international collaboration and agreements on controlling air pollution, in particular of those pollutants that are of a transboundary nature.
- Should encourage future emission reductions building on and extending decisions already taken. In particular support should be given to ongoing legislation processes with the European Union, the revision of the CLRTAP protocols, cfr the Gothenburg Protocol and its upcoming revision, and the inclusion of EECCA (East European, Caucasus and Central Asian) countries in the CLRTAP process.
- Should take an active part in future development of models and measurement methods for atmospheric constituents, taking into account the development and opportunities new satellite systems may offer.
- Should relate its further work to climate change and climate change policies, assessing in particular
  - how climate change may influence atmospheric dispersion and behaviour of pollutants, and the negative effects to human health, welfare and ecosystems;
  - how air pollutants like PM and tropospheric ozone contribute to weather and climate modification,
  - the possibilities for co-control of air pollution and climate change.

Detailed Conclusions

The influence of short lived atmospheric pollutants like PM and tropospheric ozone on climate

1. Air pollution and air pollution control is expected to significantly influence climate change through emissions of particles, particle-forming gases (SO_2 and NO_x) and ozone precursors. (Comment 2)
2. It is quite likely that the air pollution emissions over Europe have affected the regional temperature and precipitation patterns over the continent (PM and ozone most important). One can hypothesise that before World War II the soot emissions linked with in particular coal

and wood combustion, gave rise to a temperature rice over the continent.

3. After the war the dominating coal combustion was replaced by oil leading to large increases in sulphur emissions peaking around 1980. The sulphate aerosols formed from pollutant emissions of SO_2, may have cooled the continental surface significantly, preventing the full climate warming effect of the increasing GHG emissions to be realised. Today both SO_2 and PM emissions are significantly reduced in Europe leading to more or less full realization of the radiative forcing of the GHG emissions. A faster rise in the regional surface temperature than what could be expected from the GHG emissions alone, may have taken place. We should, however, bear in mind that the global warming is not in a steady state as the oceanic heating takes time. Also the further heating is not expected to be as rapid as during the past two decades over Europe as the further reduction in the aerosol load is expected to be minor (Comment 1).
4. Carefully chosen, further emission control measures can reduce the expected temperature increase over the next decades at the same time as the air pollution load is reduced. Methane and black carbon are important in this context as these two species cause a heating at the surface, while methane has a controlling influence on background ozone and black carbon is an important part of PM.

Climate change may change the air pollution load

5. Climate change will influence the dispersion and impact of air pollution. In particular increased temperature may influence ozone levels. (Comment 3)
6. Climate change feedbacks can influence the atmospheric pollutant loads including the precursor emissions. Several feedbacks have been proposed but few of them are well understood, and thus difficult to quantify accurately. One of these feedbacks is the increased emissions of isoprene in warmer weather.
7. The impact of changing climate in the air pollution load should be included in further developments of atmospheric chemistry and transport models for the calculation of atmospheric distribution of pollutants including source-receptor matrixes, and the assessment of health and environmental effects.

Climate change and integrated assessments

8. The air pollution/atmospheric science community can support climate science and policy-directed assessment with modelled and monitored data on atmospheric concentrations on trace species (particles,

ozone), source allocation of the modelled concentrations and data on control measures and their costs.

9. Co-control of air pollution and climate change. There are large benefits in coordinating air pollution and climate change control measures. Coordinated approaches can lead to an increase in the overall environmental and climate benefits while keeping the costs down.
10. Mitigating climate change and controlling air pollution include many co-benefits but also some trade-offs (penalties). These need to be included in air pollution models directed towards describing future development in terms of changes in the efficiency and character of atmospheric and air-surface exchange processes, including effects to ecosystems and human health.

Future initiatives within the framework of CLRTAP

11. EMEP Strategy. The ongoing work on a new EMEP Strategy should be supported at by HLG-NMR and the Nordic countries. The strategy development should lead to an increased emphasis on describing the interdependencies of important environmental issues like atmospheric pollution and climate change, and recommend the
    - merging of regional climate and air pollution models for the time horizon of 2020 – 2040.
    - Include radiative forcing in present regional air pollution models in order to establish source receptor matrices for this parameter.
    - Develop scenarios for traditional air pollutants loads for time horizons compatible with those for the long-lived climate gases (≈100 years).
    - Make use of GEOSS and other initiatives as a basis for comprehensive model development and their application and validation on the regional and lobal spatial scales.
    - Increase collaboration with WMO on scientific issues. WMO is in its new strategy ready to take a wider responsibility for coordinating long term monitoring and assessment of trace atmospheric constituents.

12. NMR should also make sure that national and international efforts and strategies on ecosystem (and health) effects are in line with the work and strategies within EMEP. In particular the work should:
    - Increase research efforts on interlinks between climate change and effects from air pollution, the feedbacks from climate change effects on air pollution (e.g. changes in isoprene emissions due to increased temperatures).

- Continue the work on biodiversity and its importance as a driving force for the control of air pollution, in particular reactive nitrogen.
- Increase the use of observational data for the assessment of outcomes of emission control strategies and climate change.
- Develop further models and other approaches directed to linking air pollution and climate mitigation policies.
- Support the role of CLRTAP as a leading convention for intercontinental transport of air pollution and give support to the work carried out within TFHTAP.

Comment 1: Air pollution trends in Europe

Long term monitoring shows large reductions in emissions, exposure and to some extent their environmental effects over the last 20-25 years. The large reductions in sulphur emissions mentioned in the introduction to the report have been seen in atmospheric concentrations and deposition. The reduced deposition is reflected in improvements in ecosystems, in particular with respect to soil and lake acidification. Areas of exceedance of critical loads for acidification are decreased. According to already taken decisions emissions will continue to decrease over the next decade.

For nitrogen deposition the situation is not that promising. Deposition is reduced over large parts of Europe but the decrease is mostly of the order 20% for both ammonia and oxidized nitrogen. The future will show some improvements but Europe will be expected still to face large exceedances in 2020 with consequences for ecosystems and biodiversity.

The situation with respect to ozone has improved over the last decades and the common ozone episodes 20-30 years ago are in general gone. Very hot summers, like that in 2003, may, however, show ozone peaks that will be detrimental for man and ecosystems. Over Europe, and the entire Northern Hemisphere there has instead been a steady increase in the background concentrations. This increase has reduced the space to effects thresholds and there is an increasing concern with respect to how concentrations may change in the future.

Particles and their effects to human health have over the last 10 years become the main driving force for air pollution control in Europe. Emissions of fine particles have been reduced over the last decades but they are still a considerable threat in Europe. The European Commission published in 2005 a Thematic Strategy aiming for further control of air pollution in addition to improvements that are expected from already taken decisions. The strategy has to some extent resulted in directives and at present EU is negotiating further reductions. These reductions will however not be sufficient to achieve the long term objectives for Europe with respect to human health and ecosystems.

(See also presentation of Leonor Tarrason http://www.emep.int/NMR_08/web_okt.html).

Comment 2: Atmospheric constituents contributing both to the air pollution load and to the radiative forcing change

Some of the constituents of importance for the earth's radiation balance are also atmospheric pollutants. These include:

- Tropospheric ozone, being both a greenhouse gas and an atmospheric pollutant causing negative effects to human health and ecosystems.
- Particles being a threat to human health but also contributing to the earth's radiation balance through;
    - Increasing global warming through direct absorption of sunlight. This effect is mainly active via soot particles.
    - Counteracting global warming directly through reflecting incoming sunlight, mainly through sulphate particles.
    - Counteracting global warming indirectly through the role of particles as cloud condensation nuclei (CCN) essential for cloud formation and determination of cloud properties.
    - Black particles (soot) may contribute to global warming when deposited on ice which melts faster than it would have done otherwise. Nitrate particles deposited onto ecosystems can also indirectly contribute to increased radiative forcing through the denitrification of some of the reactive nitrogen to nitrous oxide (N_2O). (Reactive nitrogen in terms of air pollution emissions are dominated by nitrogen oxides (nitrogen monoxide and nitrogen dioxide) and ammonia).
- Methane, although being an important greenhouse gas, is normally not considered as an atmospheric pollutant. Methane is, however, a main precursor for tropospheric ozone, in particular for the tropospheric ozone background level.

Particles and reactive nitrogen have atmospheric lifetimes of a few days while for ozone in the free troposphere it is of the order of one month. Their atmospheric impact corresponds to their lifetimes. The influence is rapid and regionally confined. Greenhouse gases such as carbon dioxide, nitrous oxide and halocarbons are long-lived, of the order of 10 years for methane, and 100 years for CO_2 and many halocarbons which means that their radiative impact is similar all over the globe and their impact will last for a long time even if emissions have been reduced.

It is quite likely that the air pollution emissions over Europe have affected the regional temperature and precipitation patterns over the continent (PM and ozone most important). One can hypothesise that before World War II the soot emissions linked with in particular coal and wood combustion for domestic heating purposes, gave rise to a surface temperature rise over the continent. After WWII the dominating coal combustion was replaced by oil leading to large increases in sulphur emissions and a probable decrease in soot emissions.

Later, peaking around 1980 the sulphate aerosols formed from pollutant emissions of SO_2, cooled the continental surface significantly, preventing the full climate warming effect of the increasing GHG emissions to be realised. Now both SO_2 and PM emissions are significantly reduced in Europe and the regional influence due to sulphate aerosols to a large extent gone and the GHG emissions almost fully realised. We should, however, bear in mind that the global warming is not in steady state as the oceanic heating takes time.

As a first approximation, we can assume proportionality between carbon sequestration by terrestrial ecosystems including cultivated land and forests, and the deposition of reactive nitrogen. The emissions of reactive nitrogen thus provide a significant negative feedback on the greenhouse effect of CO_2 as nitrogen fertilisation reduces the airborne faction of CO_2. Climate change may turn on sudden releases to the atmosphere of N and C stored in terrestrial biomass as CO_2 and N_2O, a positive feedback between rising temperatures and GHG emissions.

Surface ozone enhancement inhibits CO_2 sequestration in that there is an indirect, positive feedback process between ozone and the airborne fraction of CO_2. The indirect ozone effect is probably comparable to the direct radiative forcing effect of tropospheric ozone.

Recent studies indicate that 13 to 90 per cent, with a central value of 40 per cent, of the warming by GHGs in the atmosphere is presently being masked by certain aerosols (and aerosol-cloud interactions) that increase the reflection of sunlight. These aerosols result from air pollution emissions. (ref: “Air pollution and climate change: Developing a framework for integrated co-benefits strategies”, Stockholm 17-19 September 2008, main conclusions, http://www.sei.se/gapforum/reports.php).

The significant negative radiative forcing by anthropogenic aerosols over the continents may affect the distribution of weather events in a significant, but not well known, way. The probability of high impact events like droughts and floods can be affected by this mechanism.

Methane, ozone and black carbon aerosols together are a major warming component compared with CO_2. According to the Intergovernmental Panel on Climate Change, the mean anthropogenic radiative forcing resulting from all GHGs is estimated to be +3.05 W m^{-2} of which methane accounts for +0.48 W m^{-2} and tropospheric ozone for +0.35 W m^{-2}. In addition, it is estimated that black carbon accounts for +0.34 W m^{-2} in the atmosphere and an additional +0.1 W m^{-2} on snow. Regionally, however, black carbon heating effects can rival that due to CO_2 increases, for example in the Arctic and the Himalayan-Tibetan glacier regions (ref: "Air pollution and climate change: Developing a framework for integrated co-benefits strategies", Stockholm 17-19 September 2008, main conclusions).

Co-benefits and trade-offs between climate change and air pollution mitigation need to be seen together for cost-efficient abatement.

Ground-level ozone and black carbon aerosols act as warming agents. Methane is a precursor of ozone formation and a GHG. A decrease of their concentrations in the atmosphere will have health and crop-yield benefits as well as a rapid climate benefit. These substances are short-lived in the atmosphere compared to CO_2, lasting from days to weeks (ozone and black carbon) to a decade (methane) so decreasing their concentrations by cutting emissions could produce relatively quick climate benefits. Approaches to reduce methane and other ozone precursor emissions are well known and to some extent already implemented in current legislation. The involvement of the agricultural sector, forestry and mining industries are important.

Comment 3. Atmospheric interactions between climate change and air

Climate change – air pollution feedback mechanisms

Changes in climate follows from and brings with it modifications in a very long range of physical, dynamical, chemical and biological processes in the atmosphere and in terrestrial and marine ecosystems. Many of these changes in processes directly or indirectly affect the composition of the atmosphere both through the source strengths, transport, transformation and removal terms in the continuity equations for the atmospheric constituents.

- The transport terms are controlled by advection, convection and mixing properties in the atmospheric boundary layer, including the evolution of the depth of the mixed layer and the entrainment of free tropospheric air. The frequency and intensity of frontal passages are important factors.
- The transformation terms controlled by relative humidity, specific humidity, cloud cover and type, temperature, albedo and its effect on photolysis rates.
- The removal terms are controlled by precipitation frequency and amount, surface properties like vegetation composition and state, the partial pressures of oxidized and reduced nitrogen in terrestrial surfaces, and relative humidity.
- The emission terms consist of both anthropogenic sources which are determined by the level of economic activity and its geographical

distribution and the extent to which measures are taken to control emissions. Changes in temperatures, energy consumption, plant and forest species, atmosphere-ocean interaction are important for the magnitude of the biogenic emissions. Drought conditions and the amount of stored carbon in terrestrial ecosystems are important factors in how forest and biomass fires impact on the composition of the atmosphere. If there are changes in the occurrence of extended dry periods together with high wind incidents, the atmospheric source of dust will go up.

Climate change impact on air pollution

Transboundary air pollution is interpreted as the contribution from one country to the deposition or ambient air concentration in another country. Inadvertent changes in transboundary transport as a consequence of climate change can arise from changes in any of the parameters listed above. In addition, measures taken to mitigate climate change can impact on the transboundary fluxes of air pollutants, like fuel switching from fossil fuels to biofuels; or reduction of methane emissions by changing the practises of waste handling, agriculture and natural gas distribution.

In a careful review of the scientific literature on the effect of climate change on air quality, Jacob and Winner (2009) conclude that "the future climate is expected to be more stagnant, due to a weaker global circulation and a decreasing frequency of mid-latitude cyclones. The observed correlation between surface ozone and temperature in polluted regions points to a detrimental effect of warming. Coupled GCM–CTM studies find that climate change alone will increase summertime surface ozone in polluted regions by 1–10 ppb over the coming decades, with the largest effects in urban areas and during pollution episodes. This climate penalty means that stronger emission controls will be needed to meet a given air quality standard. Higher water vapor in the future climate is expected to decrease the ozone background, so that pollution and background ozone have opposite sensitivities to climate change. The effect of climate change on particulate matter (PM) is more complicated and uncertain than for ozone. Precipitation frequency and mixing depth are important driving factors but projections for these variables are often unreliable. GCM–CTM studies find that climate change will affect PM concentrations in polluted environments by ±0.1–1 μgm^{-3} over the coming decades. Wildfires fuelled by climate change could become an increasingly important PM source."

These conclusions are drawn on the basis of time correlations of observations of air pollution trends and temperature trends, and further on the present capability of chemical transport models (CTMs), or coupled general circulation models and CTMs (GCM-CTM) to capture the main processes controlling the air pollution load.

Summary

As judged from the scientific literature in general and reflected in the Jacob and Winner (2009) review, the current capability to characterize the air pollution-climate change feedbacks is quite immature, as the changing climate induces in many cases significant changes in air pollution controlling parameters over a very broad range of processes, and over a broad range of spatial and temporal scales, and many of the changes introduce feedbacks that compensate each other. The variability in the observed fields of individual pollutants is large, as is the case for the many processes controlling them, indicating that a very large number of measurements is needed to identify significant correlations.

Changes in transboundary transport of pollution as a consequence of climate change is a “second order effect” compared to the climate change impact on air pollution loads, and it is probably premature at this stage to attempt to make general statements.

Two case studies pointing out positive feedbacks between climate change and air pollution load

There are a few specific studies, however, like the one by Langner et al., 2005, where they conclude that simulations with the European scale chemical transport model MATCH indicate substantial potential impact of regional climate change on both deposition of oxidised nitrogen and concentrations of surface ozone in Europe. These calculations were “time slices” corresponding to present climate while the scenario time slices corresponded to a future situation with a global mean warming of 2.6K realised in the period 2050–2070 depending on the GCM used to derive the meteorological driver data. The simulations showed a strong increase in surface ozone expressed as AOT40 and mean of daily maximum over southern and central Europe and a decrease in northern Europe. The simulated changes in April–September AOT40 were significant in relation to inter-annual variability over extended areas. Changes in deposition of oxidised nitrogen were much smaller and also varied more depending on the GCM used for meteorological driver data. Langner et al., 2005 found that the changes in simulated annual deposition were significant in relation to inter-annual variability only (Langner et al., 2005).

In a case study of the pollution loads in the boundary layer over Europe in the summer 2003 heat wave, Solberg et al. (2008) found that the 99 percentiles of daily maximum ozone in 2003 was higher than the corresponding parameter measured in any previous year at many sites in France, Germany, Switzerland and Austria. The concentrations were particularly high in June and August 2003. Positive feedback effects between the weather conditions and ozone contributed to the elevated surface ozone. An extended residence time of air parcels in the atmospheric boundary layer was calculated. It was likely that extensive forest fires on the Iberian Peninsula, resulting from the drought and heat, contributed to the peak ozone values in North Europe in August. Measurements of isoprene showed about twice as high concentrations during summer 2003 compared to previous years, either reflecting increased biogenic emissions or reduced atmospheric mixing. Biogenic isoprene could have contributed with 20% of the peak ozone concentrations. In a CTM model sensitivity calculation it was shown that a reduction in the surface dry deposition due to drought and elevated air temperature both could have contributed significantly to the enhanced ozone concentrations, through a reduced loss to the surface, and through a more efficient photochemical formation, respectively. Solberg et al. (2008) speculated that due to climate change, episodes like the summer 2003 heat wave in Europe may occur at a higher frequency in the future and may gradually overshadow the effect of reduced emissions from anthropogenic sources of VOC and NO_x.

Sammendrag

Klima- og luftgruppen under Nordisk Ministerråd (KoL-NMR) støtter arbeidet i Langtransportkonvensjonen for grenseoverskridende luftforurensninger (Convention on Long-Range Transboundary Air Pollution (CLRTAP)). KoL-NMR har fremmet forskning og policymetodikk. Sentrale metoder er modeller for atmosfærisk transport og avsetning.

Begreper som “Critical Loads”, “Gap Closure” og “the Multi-pollutant and -effect approach” er utviklet i det nordiske samarbeidet. Dette har vært av stor betydning for policy-utviklingen både i CLRTAP og i EU. Arbeidet i CLRTAP og EU på luftforurensningsområdet er av økende betydning også på grunn av koblingen mellom luftforurensninger og klima.

På møtet i Oslo 9-10.oktober 2008 ble det konkludert med at det er økende grunnlag for å si at luftforurensningssituasjonen er betydelig påvirket av klimaforandringene mange steder, og at klimaendringene også vil endre forekomsten av luftforurensninger. I rapporten er det gjort en oppsummering av de viktigste konklusjonene og anbefalingene fra møtet.

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Annex

Nordisk ministerråd

Klima og luftforurensninger – fremtidige utfordringer for de nordiske landene innenfor LRTAP-konvensjonen og EU

Invitasjon til workshop i Oslo 9. og 10. oktober 2008

Den internasjonale diskusjonen om luftforurensninger er under langsom forandring. EU samler nå alt arbeidet med luftforurensninger i en strategi. Dette, sammen med at EU er utvidet og omfatter stort sett hele Europa, gjør at EU er blitt stadig mer dominerende i organene som tidligere drev arbeidet med å redusere luftforurensninger i Europa. Videre er tiltaksarbeidet for visse stoffer drevet til en grense der paletten av tilgjengelige tradisjonelle tiltak nå er mer begrenset og de gjenstående tiltakene er stadig mer kostbare.

Samtidig er den internasjonale klimapolitikken og fremtidige klimaendringer blitt et viktig faktor for arbeidet med luftforurensninger. Mange av de tiltak som er aktuelle innen klimapolitikken påvirker også luftforurensningssituasjonen.

Det internasjonale arbeidet med luftforurensninger reiser etter hvert også nye spørsmål knyttet til forholdet mellom lokale og regionale forurensninger, interkontinental transport av luftforurensninger og samlet syn og eventuell strategi for reaktiv nitrogen.

Vi inviterer dere/deg herved til å delta i en nordisk workshop om disse spørsmålene. Målet er at forskere, eksperter og forhandlere skal diskutere prioriteringer, forskningsbehov og forslag til nordisk initiativ innen LRTAP-konvensjonen og EU for å utvikle arbeidet med luftforurensninger videre.

Vi ønsker særlig å fokusere på spørsmål som:

- Hva er i dag de sterkeste drivkreftene for utslippsreduserende tiltak i hhv. et nordisk og et internasjonalt perspektiv?
- Hvordan kan klimapolitikken og politikken overfor luftforurensninger samordnes og hva taper vi ved ikke å samordne politikken?
- Hvordan kan de nordiske landene samarbeide om integrerte tiltaksstrategier?

- Hvilke særlige nordiske interesser kan fremheves i de kommende forhandlingene under LRTAP-konvensjonen og i EU? Og hva bør være de nordiske landenes rolle i det internasjonale perspektivet?

Agenda

Klima og luftforurensninger:

Fremtidige utfordringer for de nordiske land inn i LRTAP-konvensjonen og mot EU

Torsdag 9 oktober 2008

Ordstyrer Peringe Grennfelt
Referenter Anna Engleryd og Leonor Tarrasón

11.00	Innledning. Målet med workshopen. Eli Marie Åsen, Miljøverndepartementet
11.15	EUs luftforurensingsarbeid og CLRTAP - hvor står vi i forhandlinger og politiske prosesser? Anna Engleryd, Naturvårdsverket
11.40	Den europeiske scenen. Regional transport av luftforurensing. Hvilke forbedringer er blitt oppnådd? Skipsfartens betydning. Leonor Tarrason, met.no/emep-MSC-W.
12.05	Samarbeid mellom klima og luftforurensing. Nordisk kompetanse og forskning. Resultater fra nordisk workshop i august 2008. Kaj Hansen, DMU
12.15	**Lunsj**
13.30	Klima og luftforurensinger. Hvordan påvirker klimaendringer luftforurensingene og i hvilken utstrekning har luftforurensinger betydning for klimaet? 1. Overstyrende forhold samt ozon. Øystein Hov, met.no 2. Partikler: HC Hansson, ITM 3. Klima og luftforurensning. Samspillet atmosfære – økosystem. Ari Laaksonen, FMI
14.40	Utfordringer for framtidens luftforurensningskontrollmodeller - koblinger mellom klima og biosfæren. David Simpson, met.no/emep-MSC-W.

15.00 Kaffe

15.30 Nitrogen
1. Arbeidet i TFRN. European Nitrogen Assessment. Peringe Grennfelt, IVL
2. Nitrogenutfordringen i Europa. Steen Gyldenkærne, DMU

16.10 Økosystemet i Europa. Gjenopprettelse og betydningen av klimaforandringer.
1. Martin Forsius, SYKE
2. Harald Sverdrup, Lunds universitet

16.45 EMEP. Nye verktøy og innfalsvinkler. Kjetil Tørseth, NILU

17.00 Kaffepause med frukt

17.20 En ny luftklimaagenda. Vidtgående utfordringer innen CLRTAP. Globale initiativ. Nitrogen, Interkontinental transport. Koblingen mellom luft og klima. Ny strategi for EMEP. Innledning till diskusjoner: Øystein Hov / Peringe Grennfelt.

17.40-19.00 Diskusjon

20.00 Middag

Fredag 10 oktober 2008

Ordstyrer Anton Eliassen
Referenter Eli Marie Åsen og Øystein Hov

08.30	Bioenergi og luftforurensinger: 1. Aerosols from small scale combustion and wild land fires: Mia Pohjola, FMI 2. Helseeffekter: Raimo Salonen Kuopio Universitet
09.30	Integrerende luftforureningskontrollmodeller. Nasjonale og nordiske initiativ. Niko Karvosenoja, SYKE och Stefan Åström, IVL
10.00	**Kaffepause med frukt**
10.30	Nasjonale prioriteringer. Kort (maks 5 minutter) innlegg om nasjonale prioriteringer i de internasjonale prosessene, for å knytte dette til første punktet og som underlag for diskusjonen. - Danmark - Finland - Norge - Sverige
11.00	Diskusjon Fokus Europa: De tradisjonelle luftforurensingene og relasjonen mellom EU og CLRTAP. Klimapolitikk og luftforurensingskontrollpolitikk i sammenheng Innledning Christer Ågren, Air Pollution and Climate Secretariat
12.15	**Lunsj**
13.15	Avsluttende diskusjon. Oppsummering
14.30	Avslutning. Sammendrag: Hvor går vi nå?

LIST OF PARTICIPANTS

Danmark

Kaj Mantzius Hansen	Danmarks Miljøundersøgelser , Aarhus Universitet
Lars Moseholm	Danmarks Miljøundersøgelser , Aarhus Universitet
Ole Hertel	National Environmental Research Institute Aarhus Universitet
Steen Gyldenkærne	Danmarks Miljøundersøgelser Aarhus Universitet

Finland

Alec Estlander	Finnish environment institute (SYKE)
Ari Laaksonen	R&D Finnish Meteorological Institute
Jens Perus	Hav- och Luftgruppen Nordiska Ministerrådet
Martin Forsius	Finnish environment institute (SYKE)
Mia Pohjola	Air Quality Research Finnish Meteorological Institute
Niko Karvosenoja	Finnish environment institute (SYKE)
Raimo O. Salonen	Avdelningen för miljöhälsa Folkhälsoinstitutet
Seppo Sarkkinen	Miljöministeriet
Yrjö Viisanen	R&D Finnish Meteorological Institute

Norge

Anton Eliassen	Meteorologisk institutt
Brit Lisa Skjelkvåle	Norsk institutt for vannforkning
Cathrine Lund Myhre	Norsk institutt for luftforskning
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Sverige

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