TASK FORCE ON INTEGRATED ASSESSMENT MODELLING (TFIAM)

44th session, 6 - 8 May 2015
Edinburgh, United Kingdom of Great Britain and Northern Ireland

Chairs report

I. INTRODUCTION

1. This report describes the results of the 44th session of TFIAM, held from the 6th to the 8th of May 2015 in Edinburgh, United Kingdom. The presentations made during the meeting and the reports presented are available at:

http://www.iiasa.ac.at/web/home/research/researchPrograms/MitigationofAirPollutionandGreenhousegases/past_meetings.html

2. 36 experts attended, representing the following Parties to the Convention: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland, and United Kingdom of Great Britain and Northern Ireland. Observers from China, India and Kenya were attending the meeting. Also, the EMEP Centre for Integrated Assessment Modelling (CIAM), the ICP Vegetation, the Joint Research Centre, the European Environment Bureau (EEB) and the European Commission were represented.

3. Mr. R. Maas (Netherlands) and Mr. S. Åström (Sweden) chaired the meeting.

II. OBJECTIVES OF THE MEETING

4. Mr. Maas opened the meeting, presented the latest developments within the CLRTAP, and defined the purpose of the 44th TFIAM meeting, which were to learn about recent European policy analyses and national modelling experiences, and to share national experiences of ammonia emission modelling and scenario calculations.

5. News from the secretariat:

- Ms. Anna Engleryd was elected chair for the EB in December 2014.
- Additional technical guidance has been developed for the adjustment procedure of the Gothenburg protocol.
- The EB has adopted a report on good agricultural practices that can help parties in taking action on reducing NH3 emissions.
- There are a couple of outreach activities beyond the UNECE region:
    i. Co-operation with the Stockholm Convention on POPs
    ii. Co-operation with the Arctic council on Black Carbon

- The 2016 CLRTAP Assessment Report is planned to be presented at the 8th European Environment ministerial conference in Georgia in June 2016.
- 2016-2017 work plan
    i. The latest Global Burden of Disease report highlighted air pollution as the main environmental health issue. This has increased attention to air pollution from WHO, UNEP and other international bodies. Outreach activities and co-operation with other organisations should be explored
    ii. Capacity building is recognised to be as important, priority is given to emission inventories and abatement technologies.

6. Update on EU policy:
    - In December 2013 a Clean Air Policy Package, including a new NEC-Directive and a Directive on Medium-scale Combustion Plants was released by the European Commission.
    - The commission had asked member states to comment on the ratification of the POP and Heavy Metal protocols. No national comments have been submitted from member states to the presidency, so the ratification is progressing.
    - The status of ratification of the Revised Gothenburg Protocol:
        i. some countries would like to see the ratification as part of the adoption of the revised NEC-Directive.
        ii. an early ratification would secure that new Parties, in particular the EECCA countries, can benefit from the flexibility now built into the Protocol up to end 2019.
        iii. since there is a very limited risk for member states to take on obligations of the EU the European Commission is not opposing member states that want to move forward with ratifying the revised protocol individually.
        iv.
    - An agreement is reached in the European Council of Ministers on the Medium Combustion Plant Directive. Discussions have started in the parliament. A voting on the amendments took place on the 6th of May. A deal with the Council is expected after the summer break of the Parliament.
    - The proposed NEC-Directive has not been withdrawn, but an amended proposal from the European Commission might occur after the reading by the parliament. The Environment Committee of the European Parliament is scheduled to vote on amendments in July. The Parliament is using an GAINS scenario that closely resembles the targets established in the Climate and Energy Policy Package for 2030. The European Council of Ministers is working on a proposal based on the PRIMES 2013 reference scenario and updated national emission data.

The Council will have a first formal discussion on the NEC-Directive in June. Currently discussion focusses inter alia on the inclusion of Methane and on the nature of the interim 2025 targets.

III. RECENT POLICY ANALYSIS

7. GAINS model runs were extensively used to support of the EU Clean Air Policy Package. The need for international co-ordinated action is illustrated by the large contribution of transboundary sources to urban PM2.5-levels in several cities. Reducing local air pollution emissions will not be enough to reach air quality targets in many European countries. The contribution of secondary aerosols is substantial. Ammonia plays a crucial role in the formation of secondary aerosols.

8. In 2014-2015 the GAINS team has worked on updating national information on the basis of bilateral consultations with all EU member states. Key issues during these consultations were:

- Changes in national base year (2005) emission estimates between 2012 and 2014. The largest changes were for PM2.5.
- Differences in source coverage between GAINS and national data.
- Differences in emission inventory methods (Tier 1-methods vs. the Tier 2-method used in GAINS).
- Discrepancies between energy statistics used for national emission calculations and the energy data reported by Member States to Eurostat (that were used in GAINS).
- Differences in emission factors due to national circumstances.
- Differences in activity projections, assumed national legislation and assumed autonomous technological improvements.
- Differences in remaining mitigation potentials.

After the bilateral consultations the GAINS base year estimates show a reasonable comparison to the national emission inventories reported in 2014. The result of the bilateral consultations is found in TSAP report #14.

9. In TSAP report #16 an updated NEC directive proposal scenario has been analysed at the request of the European Council. In this scenario the additional abatement costs required were reduced to 2.2. bn €/yr. Monetised health impact benefits are almost a factor 10 higher than the abatement costs. Methane emission control provides larger cost savings. Current legislation already provides almost 90% of required SO2 emission reduction by 2030, 95% for NOx and 85% for NMVOC. Current legislation achieves 60% of the ambition level for PM2.5, and 30% of the ambition level for NH3.

10. At the request of the European Parliament the GAINS team made a sensitivity analysis on the Clean Air Policy Package by including the new climate and energy

policies to 2030. The “optimal” air pollution ceilings could become more stringent at the same costs. The costs of a 75% gap closure ambition level in the non-climate policy scenario would equal a 92% gap closure ambition level in the scenario including climate policy.

IV. UPDATES ON EUROPEAN SCIENTIFIC RESEARCH

11. The ICP on Vegetation had analysed trends in ozone and the interactive impacts of ozone and nitrogen pollution on vegetation and temporal trends in ozone. Recent research shows that ozone and nitrogen can have counteracting impacts on biomass growth. The biomass growth benefits of nitrogen deposition appear to have a limithave their limit.. High ozone concentrations change the carbon/nitrogen ratio enhance the nitrogen concentration in leaf litter from trees, affecting nitrogen cycling in soils. and can increase nitrogen leakage. Between 1990 and 2010, ozone trends show an increase in background levels, while peak concentrations are decreasing. Hemispheric co-operation would be needed to tackle increasing background levels.

12. The new Task Force on Techno Economic Issues (TFTEI) will focus on emission abatement technologies from stationary and mobile sources. Tasks include to upgrade and assess on a regular basis the information on technologies to reduce emissions of SO2, NOx, VOCs, PM10, PM2.5, Black Carbon, Heavy metals and POPs. TFTEI is aiming to create a reference place (clearing house) for pooling knowledge on emission abatement technologies and related costs. TFTEI is expected to co-operate with other bodies of the Convention, especially TFIAM and TFEIP. TFTEI will also co-operate with the coordination group for EECCA countries. The TFTEI website will be available in English and Russian. The co-chair of TFTEI reminded parties of the convention to nominate their experts (especially for POPs) to participate in the TFTEI work.

13. A study by University College London showed that in a post-Carbon world the use of ammonia as a synthetic fuel for mobile combustion engines could become a realistic option. Such a synthetic fuel could be produced by using renewable electricity.

14. NOx-reductions from ships could contribute to a cost-effective improvement of air quality and deposition on land. The NEC-Directive proposal contains a flexibility option allowing countries bordering sea to offset a limited part of their national emission reduction commitments by reductions in international shipping. The main aim is to encourage these member states to more actively engage in the establishment of emission control areas (ECA). According to a study by PBL and FMI this could lead to cost-reductions for some countries. However as maritime baseline data are still uncertain, the environmental impact of the NEC-Directive could weaken when countries exchange certain emission reductions on land with uncertain reductions at sea. Both the European Parliament and Council seem to be hesitant about the proposed flexibility mechanism.

15. The FP7-project APPRAISAL will soon be finalised. APPRAISAL will offer an online database of local Air Quality and Health Impact plans. Currently the database is covering some 65 plans. Common in the plans are the use of scenario assessments and (in some cases) optimization approaches at the local scale. APPRAISAL offers guidance on the integration of information at different scales, emission inventory uncertainties, integration of ground based & remote sensing monitoring, PM-fractions, multi-pollutant exposures, socio-economic aspects, energy efficiency and non-technical measures as well as multi-scale interactions.

16. In the FAIRMODE forum, tools are being developed to enable the evaluation of air quality models used in scenarios to assess the potential contribution of local, national and international measures. The focus is to propose a common harmonised template to allow a meaningful inter-comparison of model results. The forum is looking for volunteers to share their experience on existing evaluation methodologies and to propose possible ways forward.

17. There is an increasing interest in economic costs of air pollution, also from sectors not traditionally working on air pollution, such as the health sector. In the WHO Choice database the cost estimates of air pollution have been updated. The latest review reinforces the earlier finding that the monetized environmental and human health benefits are larger than the costs in the NEC-Directive proposal of the European Commission. The UK Committee on the medical effects of air pollutants (COMEAP) is currently reviewing a number of existing and emerging human health issues. Monetized damages from heavy metals is being further developed following recent developments in knowledge on human health impacts from heavy metals. The external costs from large plants (E-PRTR facilities) show that currently, approximatelly 90% of the total human health damage is caused by the largest 15% plants in Europe.

18. Recent developments in the valuation of ecosystem damage still implies that the economic value of ecosystem benefits is much smaller than the human health benefits. Nevertheless impacts on ecosystems remain important from a sustainable development point of view.

19. A joint workshop of TFIAM and TFHTAP has reviewed the available global emission scenarios for air pollutants. GAINS offers a large number of potential abatement measures. GAINS scenarios show that without additional measures emissions tend to increase. In climate policy scenarios an automatic implementation of additional measures is assumed when incomes increase. It was recommended to supplement GAINS scenarios with scenarios that include regional perspectives (e.g. Asia).

V. EXPERIENCES IN AGRICULTURAL MODELLING

20. Ammonia emission scenarios with the GAINS model currently take into account developments in farm sizes. Although today most of the farms in the EU have less

than 15 live stock units, the majority of the livestock is kept by a very small number of large industrial size farms. 80% of NH3-emissions comes from less than 10% of the farms. Additional measures suggested by the new NEC-Directive would affect 2-2.5% of the total number of farms in the EU.

21. Due to updates in its emission inventory in 2015, Germany will no longer comply with the NH3-emission levels in the existing NEC-Directive, and will have large problems reaching the proposed ambition level in the revised NEC-Directive. Available additional measures could reduce German NH3-emissions by about 33% by 2030.

22. As part of an industry response to the abolishment of the milk quota, Ireland expects a substantially higher increase in dairy activity relative to the outlook estimated by the European CAPRI-model. National analysis of the industry outlook suggests that the divergence in emission pathways will render Ireland unable to meet the NH3-emission reduction obligations of the amended Gothenburg protocol or the proposed NEC-Directive revisions.

23. Emissions of NH3 in Denmark have declined substantially from 1985 levels, but there are still a high risk of exceedance of critical loads for eutrophication for many of the Natura 2000 areas in Denmark. The NH3 emission targets in the proposed NEC directive have been heavily debated in Denmark. However, the targets suggested are considered feasible.

24. In the Netherlands ammonia emissions to air are part of an integrated analysis of nitrogen losses. Nitrate leaching, N2O-targets and nitrogen deposition on Natura2000 areas are binding restrictions. If the abolishment of the milk quota will lead to more nitrogen losses, compensation is expected by more export of manure as well as adding more advanced emission reduction measures such as air scrubbers.

25. Currently Sweden has good opportunities to meet the requirements in the proposed NEC-Directive. The co-benefits of measures reducing emissions of Greenhouse gasses and NH3 from the agricultural sector is an area that would need further attention.

26. For Switzerland a nitrogen flow model showed that there was a good potential to reach the NH3 objectives posed by the amended Gothenburg protocol (8% reduction). Scenario analyses show opportunities to reduce emissions even further; an MTFR scenario yielded a potential reduction of more than 40% in 2030 compared to 2005 levels.

27. In the United Kingdom current and future emissions of NH3 are based on nitrogen flow modelling, and include collecting yards for cattle as a significant source. A range of abatement measures have been analysed and costed. Two abatement scenarios were analysed, based on low and high efficiency measures respectively. These were built up starting from more cost-effective measures for spreading of slurries and manures, then superimposing measures for storage, and finally the more expensive housing measures. Combined with fertiliser measures these

could achieve reductions of between 12 and 20% relative to the baseline scenario in 2030.

28. According the amended Gothenburg Protocol Finland would need to reduce its NH3-emissions by 20%. With current policies emissions are expected to drop by 8% compared to 2005 emission levels. Analyses of additional policies showed that the proposed NEC-Directive ambition level, is feasible for most pollutants, regardless the carbon scenario that is assumed.

VI. OTHER NATIONAL INTEGRATED ASSESSMENT MODELLING

29. A sensitivity analysis of domestic PM2.5 emission reductions in Finland showed the limitied impact of the Ecodesign Directive by 2030, due to the slow turnover of domestic heating equipment. A comparison between the European Commission estimates of installations affected by the MCP-Directive showed a significant difference with a recent Finnish inventory of the number of plants. Compliance cost for PM was estimated to be a factor of 10 higher than the estimate of the European Commission, while costs for SO2 and NOx were estimated to be lower.

30. The Irish research unit EnvEcon had developed an innovative method to quantify marginal damage values of the NEC-Directive air pollutants in Ireland. The approach uses an array of methodologies and data sources, as well as spatially distributed emission and air pollution monitoring data. The analysis will be used to generate an accessible guidebook to facilitate appropriate weighting of air pollutants into decision making. .

31. In Spain the integrated assessment model AERIS is now operational. AERIS calculates mean annual ambient air pollution concentration levels on a 4*4 km2 spatial resolution. Impacts include health damage due to exposure of particulate matter, ozone damage to crops and forests, exceedances of critical loads for acidification and eutrophication as well as damages to buildings. Road side air quality modelling was also performed to assess local traffic policy.

32. Portable Emission Measurement Systems were used in the United Kingdom to assess real life NOx-emissions from Euro-6 vehicles. For many diesel cars emissions appear to be higher than the type classification emission limits. This uncertainty in the real emissions from euro 6 vehicles has a large impact on the possibility to reach the ambition levels in the NEC-Directive proposal and the likelihood of meeting the air quality limit values for NO2 at the kerbside.

33. A renewable energy study by University College London showed that a strong reduction greenhouse gas emissions will require transforming the energy system at the local, national and European scale. The challenge is to deal with the increased variability in electricity production based on renewable resources, i.e. the need for storage facilities of energy and an electricity grid that can easily exchange wind, hydro and solar energy throughout Europe.

VII. FURTHER WORK

34. On of key messages from the CLRTAP Assessment Report will be that remaining air pollution related health challenges cannot be solved via local policies alone. Secondary particles form a large share of PM2.5 exposure and are a transboundary air pollution problem. To meet WHO air quality guidelines measures will be needed on the international scale (e.g. effective Euro-standards), the national level (e.g. stringent emission control of cars). as well the local scale (e.g. Low Emission Zones to stimulate replacement of old cars).

35. Most of the tasks described in the 2014/2015 work plan of TFIAM have been completed. There was a lack of funding to support EECCA country participation and web communication of results and developments. A workshop late 2015/early 2016 focussed on local measures to improve health is being considered.

36. The work plan for 2016/2017 is currently under development and input is appreciated. Besides European policy support, further model and scenario development and continuation of the exchange of national experiences, tasks will involve linkage with local scale health policies as well as linking with global/hemispheric policies and linkage with integrated nitrogen management. Given reduced funding and increased need for networking with national and local scale modellers in both western and eastern parts of Europe there is a rationale to apply for networking funds where available. Also for capacity building in EECCA-countries additional funds will be required.

37. The time and venue for the 45th TFIAM meeting in May 2016 is yet to be decided. Suggestions are welcome.