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**ECONOMIC COMMISSION FOR EUROPE**

**EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE  
TRANSBOUNDARY AIR POLLUTION**

Working Group on Strategies and Review

Forty-seventh session  
Geneva, 30 August–3 September 2010  
Item 3 of the provisional agenda

**OPTIONS FOR REVISING THE 1999 GOTHENBURG PROTOCOL TO ABATE  
ACIDIFICATION, EUTROPHICATION AND GROUND-LEVEL OZONE**

**REACTIVE NITROGEN**

Report by the Co-Chairs of the Task Force on Reactive Nitrogen

**I. INTRODUCTORY REMARKS**

1. This report, prepared in cooperation with the secretariat, describes the results of the fourth meeting of the Task Force on Reactive Nitrogen, held on 12 and 13 May 2010 in Prague, Czech Republic, in accordance with item 1.9 of the 2010 workplan for the implementation of the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/96/Add.2), adopted by the Executive Body at its twenty-sixth session in December 2008. The background documents and presentations made during the meeting and the reports presented can be accessed at: [www.clrtap-tfrn.org](http://www.clrtap-tfrn.org).

### **A. Attendance**

2. Sixty-one experts from the following Parties to the Convention attended the meeting of the Task Force: Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, the Russian Federation, Spain, Sweden, Switzerland and the United Kingdom of Great Britain and Northern Ireland.

3. Also present were representatives from the Working Group on Strategies and Review and the Working Group on Effects, as well as experts from the International Cooperative Programme (ICP) on Modelling and Mapping of Critical Loads and Levels and Air Pollution Effects, Risks and Trends (ICP Modelling and Mapping); the Joint Expert Group on Dynamic Modelling; the EMEP<sup>1</sup> Centre for Integrated Assessment Modelling (CIAM) at the International Institute for Applied Systems Analysis (IIASA); the Expert Group on Techno-economic Issues; the European Commission Directorate-General for the Environment; Fertilizers Europe (EFMA); the United Nations Environment Programme (UNEP) Global Partnership on Nutrient Management; and the Global Air Pollution (GAP) Forum.

### **B. Organization of work**

4. The Task Force was co-chaired by Mr. O. Oenema (Netherlands) and Mr. M. Sutton (United Kingdom). It was hosted by the Czech Ministry of Agriculture, with support from the research networking programme “Nitrogen in Europe” (NinE) of the European Science Foundation (ESF).

5. The Task Force regretted that, due to resource constraints, the secretariat was not in a position to attend the meeting.

6. The representatives of the Czech Ministry of Agriculture and the Czech Ministry of Environment opened the fourth meeting of the Task Force and outlined some of the challenges presented in revising the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol).

## **II. MAIN OBJECTIVES**

7. The Task Force mainly worked in plenary session, with an emphasis on relating its work to activities within and outside the Convention linked to reactive nitrogen (Nr) and an integrated approach to the management of the nitrogen (N) cycle. It also discussed the preparation of a report on nitrogen and climate interactions, as requested by the Executive Body at its twenty-seventh session in 2009 (ECE/EB.AIR/99, para. 86 (c)). The Task Force divided into groups to discuss replies by Parties to the Convention’s 2008 and 2006 Questionnaires on Strategies and Policies for Air Pollution Abatement (ECE/EB.AIR/2007/5 and ECE/EB.AIR/2005/4.Add.1 and

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<sup>1</sup> The Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe.

Add.2) and how those replies related to the experience of the experts present at the meeting. Those groups then reported their conclusions to the Task Force in plenary.

8. An expert from the Czech Republic gave a presentation on “Integration of nitrogen flows in the Czech Republic”, including the establishment of a national nitrogen input-output budget, and highlighted the availability of the required input information. Nitrogen losses from the combined agriculture, industry, transport and household sectors were found to be much larger to air (mainly as ammonia and nitrogen oxides) than to water (mainly as nitrate and organically bound nitrogen).

### **III. MITIGATION OF AGRICULTURAL NITROGEN UNDER THE GOTHENBURG PROTOCOL**

9. The Task Force Co-Chairs reported on the current status of work achieved by the Task Force on revision of annex IX to the Gothenburg Protocol, as presented to the forty-sixth session of the Working Group on Strategies and Review in April 2010. Taking note of the feedback from the Working Group, the Task Force acknowledged that its priority tasks were to update the Guidance document on control techniques for preventing and abating emissions of ammonia (NH<sub>3</sub>) (EB.AIR/WG.5/2007/13; hereinafter, the Guidance Document) and to provide specific information on costs and benefits of measures suggested by the Task Force in relation to a revised annex IX. The Task Force noted that work on revision of the United Nations Economic Commission for Europe (UNECE) Framework Code for Good Agricultural Practice for Reducing Ammonia (EB.AIR/WG.5/2001/7) was of lower priority, since that revision would be dependent on prior agreement of the updated Guidance Document. The Task Force agreed that a draft of the updated Guidance Document would be provided as an informal document to the forty-seventh session of the Working Group in August 2010.

10. The Co-Chairs of the Task Force’s Expert Panel on Mitigation of Agricultural Nitrogen (from Canada and Czech Republic) presented a summary of proposed annex IX options in table format. The Expert Panel reported progress in allocating tasks for the updating of the Guidance Document, and proposals for further minor amendments to annex IX of the Gothenburg Protocol (as detailed in section VII of this report). It was agreed that the revised Guidance Document would make reference to approaches that as far as possible avoided pollution swapping in relation to greenhouse gas emissions and water pollution.

11. The representative of CIAM reported on progress on the cost estimation of the options for revision of annex IX, as requested by the Working Group. Estimates of current economic figures for measures and the way in which the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model operated were presented. It was noted that GAINS was primarily aimed at optimization of measures and strategies to achieve targets across the whole UNECE area rather than on a national level. The Task Force welcomed the work of the CIAM, while noting that some experts considered the costs of ammonia abatement would in many cases be cheaper than currently estimated. The Task Force agreed that it was a priority to develop consensus on the costs of the ammonia mitigation options for annex IX.

12. The representative of the European Commission presented the Commissions’ perspective on the annex IX options. The current discussion priorities for the Commission within the context

of the Working Group were ambition level; scope; potential flexibilities for countries in Eastern Europe, the Caucasus and Central Asia; and the legal character of the revised annex IX. The Task Force should, moreover, identify priority measures in annex IX and quantify the costs and benefits (in terms of emission reductions) achievable through those key measures. Consistency with EU legislation should be ensured as far as possible. The Task Force should also highlight benefits, in quantitative terms, of the inclusion of the cattle sector in the revised annex IX, so as to facilitate the discussion within the Working Group.

13. The Task Force discussed the priorities as set out by the Working Group related to updating annex IX and the Guidance Document. It was noted that a considerable amount of work still needed to be done, especially related to the estimation of cost and benefits of the measures in annex IX. The Task Force Co-Chairs therefore proposed the holding of a workshop on estimating costs of ammonia abatement adjacent to the fifth Task Force meeting (tentatively scheduled for October 2010), with its outcomes to be reported to the Working Group at its forty-eighth session in April 2011. The Task Force agreed to ask the Bureau of the Executive Body to add the workshop to the Convention's list of meetings

14. The Task Force agreed that all sources of ammonia emissions needed to be addressed, including those from cattle, which accounted for around 50 per cent of total European ammonia emissions from agriculture. The Task Force agreed that the priority measures for annex IX should focus on:

- (a) Nitrogen management and feeding for cattle, pigs and poultry;
- (b) New and largely rebuilt housing for pigs and poultry;
- (c) Manure storage for cattle and pigs outside of animal houses;
- (d) Land application of slurry and solid manure for cattle, pigs and poultry; and
- (e) Land application of urea-containing fertilizers.

15. Measures to reduce emissions from cattle housing were considered lower priority because of limited technical capability, while emissions from other livestock (sheep, goats, buffalo, horses, camels, minks, etc.) were considered lower priority based on their limited contribution to total UNECE emissions.

16. The Task Force agreed a number of specific amendments to the proposed options for revision of annex IX (as explained in the annex to this report). The updated proposal for annex IX was provided separately (ECE/EB.AIR/2010/13). Other issues related to the revision of the Gothenburg Protocol were considered under nitrogen budgets (see below).

#### **IV. NITROGEN BUDGETS**

17. The Co-Chairs of the Task Force's Expert Panel on Nitrogen Budgets (from Austria and the Netherlands) reported on the work on nitrogen budgets at different spatial scales, including both national-scale and farm-scale. National budgets from at least six countries were now

available (including Canada, Germany, the United Kingdom and Switzerland). Those budgets had been developed using a common template devised within the group, which allowed direct comparisons between countries. Technical improvements to increase user-friendliness of the template were also planned. The Task Force noted several uses of such national budgets, including as a quantification tool for the development of scenarios, as a communication tool to identify intervention points and as a tool to develop indicators. The Task Force agreed that the Expert Panel would contribute to development of farm-scale farm-gate balances (in collaboration with the Organization for Economic Cooperation and Development (OECD)) and that national budgets and efficiency figures could be used for benchmarking. The Task Force requested the Expert Panel to prepare text describing nitrogen balance approaches for including in the Guidance Document, in relation to the measures proposed for annex IX.

18. The Task Force noted that national nitrogen budgets provided a valuable approach to report progress on measures to reduce nitrogen losses and to improve overall nitrogen use efficiency at the regional scale. The Task Force therefore agreed to forward the following option for incorporation in a revised version of the Gothenburg Protocol (Article 6: Strategies, Policies, Programmes, Measures and Information) for consideration by the Working Group: “Each Party shall/should set up a system to establish and report national nitrogen budgets. These national nitrogen budgets should cover all major flows of reactive nitrogen in order to support future improvement programmes, as well as intercountry comparisons. The Parties shall strive to harmonize their efforts as well as their reporting methodology, taking into account the methodology presented in the Guidance Document V adopted by the Executive Body at its seventeenth session (decision 1999/1) and any amendments thereto”.

## **V. NITROGEN AND FOOD**

19. The Co-Chairs of the Task Force’s Expert Panel on Nitrogen and Food (experts from EFMA and the Netherlands) presented a workplan to create a better understanding of the relationship between human diets and the nitrogen cycle, including defining product categories and environmental effects in relation to those categories. The Expert Panel would touch upon issues related to changing consumer behaviour and production systems and address possible synergies and trade-offs in relation to ammonia emissions, greenhouse gas balance, land use and water use. The Task Force noted the plan of the Expert Panel to meet in October 2010 to further those aims. The Task Force agreed to provide an informal document to the forty-seventh session of the Working Group outlining the aims and structure of its report on nitrogen and human diets.

20. To guide its further work, the Task Force invited the Working Group on Strategies and Review to indicate whether it agreed that the study on nitrogen and food:

(a) Should, in its first phase, be focused on the European part of the UNECE region, but including the potential effects on feed production outside of Europe, and of import and export of meat and dairy products. An initial limitation of the scope would be desirable, given the available resources and the geographical composition of the contributing experts; and

(b) Should mainly focus on the consequences of dietary changes and not on how to achieve such changes.

## **VI. NITROGEN AND CLIMATE**

21. In response to the request of the Executive Body at its twenty-seventh session in December 2009 (ECE/EB.AIR/99, Para. 86 (c)), the Task Force initiated a plan to prepare a report on nitrogen and climate interactions so as to inform the Gothenburg Protocol revision process. Progress on that report was presented by an expert from the Netherlands. The expert outlined the important links between nitrogen and climate and proposed an outline structure for the report, including links with associated reports to be presented to other international conventions. The Task Force agreed to support and deliver the report in advance of the twenty-eighth session of the Executive Body in December 2010.

## **VII. INTEGRATING NITROGEN MANAGEMENT-NATIONAL VIEWPOINTS AND CURRENT WORK**

22. An expert from the United Kingdom presented information on the EU Water Framework Directive and its links with air pollution issues. She explained that indicators for the health of water bodies varied widely between specific geographic areas, but were being applied to all water bodies in catchments (streams, rivers, lakes). Based on review work in the European Nitrogen Assessment (ENA), a threshold for nitrogen effects in fresh water bodies had been identified of 2 mg per litre, which was much more stringent than the limit established by the EU Nitrates Directive. Future development of management plans to achieve good ecological status of water bodies would require coordinated international efforts to reduce nitrogen losses from both agriculture and sewage sources.

23. An expert from Portugal reported on the emissions of nitrogen oxides and ammonia into the atmosphere in Portugal, emphasizing the role of lichens as bioindicators of nitrogen effects in both urban and rural areas. She reported clear environmental impacts of both nitrogen oxides and ammonia at local and regional scales, highlighting how the measurements in Portugal had been used to help establish the new critical level for ammonia (ECE/EB.AIR/WG.5/2007/3, para. 9). The representative of the Working Group on Effects welcomed the work, and invited the Portuguese expert and others in the Task Force to participate in the workshop on "Review and revision of empirical critical loads and dose-response relationships related to nitrogen", which would be organized by ICP Modelling and Mapping in the Netherlands from 23 to 25 June 2010.

24. An expert from the Czech Republic reported on nitrogen management in Czech agriculture with particular reference to the EU Nitrates Directive. Political changes in the early 1990s had reduced nitrogen fertilizer use and livestock numbers, but, since then, fertilizer nitrogen use had been steadily increasing to sustain agricultural productivity. He also reported on the designation of nitrate-vulnerable zones and on action plans to reduce nitrogen losses from agriculture within those zones.

25. The national focal point for France informed the Task Force about a mirror activity within France which had encouraged further thinking on integration of nitrogen-related issues across French ministries.

26. The Task Force welcomed the reports from the national experts, which highlighted successes and challenges in developing integrated approaches to nitrogen management.

### **VIII. REPORTS FROM CONVENTIONS AND OTHER INTERNATIONAL ACTIVITIES**

27. An expert from the United Kingdom provided an update on the progress of ENA, as a key contribution to developing integrated understanding on nitrogen issues within the Task Force. The chapters of ENA were now undergoing peer review, with the final assessment to be launched at the “Nitrogen and Global Change” event to be held in Edinburgh from 11 to 15 April 2011. In addition to the public launch of ENA, the event would include a high-level workshop for policymakers on “Future Nitrogen Policies”. It was proposed to organize that workshop jointly with the Task Force. The linked international science conference would include presentations of the results from the NitroEurope Integrated Project, together with those of ESF’s NinE programme, the European Cooperation in the field of Scientific and Technological Research (COST) Action 729 (Assessing and Managing nitrogen fluxes in the atmosphere-biosphere system in Europe) and national and international research activities.<sup>2</sup>

28. The Chair of the steering group of the UNEP Global Partnership on Nutrient Management (GPNM) presented the work accomplished in establishing the Partnership, which was a global initiative bringing together different conventions and other programmes with key stakeholders to foster improved nutrient management. He highlighted the opportunities for involvement of the Task Force as a partner in the work of GPNM, which could include sharing experiences of the Task Force with other partners, including experiences related to nitrogen management in other regions and other problems such as marine eutrophication. The Partnership could also play a role in the authorization process to commission a future Global Nitrogen Assessment. The Task Force agreed that, in keeping with its mandate, there would be benefits from closer cooperation with GPNM. It decided to ask the Working Group on Strategies and Review and the Executive Body for further guidance, including on the ways to link the Convention’s activities with those of GPNM.

29. An expert from the United Kingdom reported progress within ENA regarding possible future linkages between international conventions, including options for promoting cooperation and coordination of nitrogen management. There was a need to bring together relevant multimedia nitrogen science to provide cross-cutting information to underpin policy decisions. The Task Force noted that nitrogen budgeting could be a key component in communicating links between air, water and other issues for policymakers. The Task Force agreed to prepare an informal document for the Executive Body and for the Working Group on Strategies and Review on a vision for future nitrogen management within the UNECE, highlighting the possible future role of the Convention and the potential for joint work with other UNECE and international conventions.

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<sup>2</sup> Further information on this event can be found at: <http://www.nitrogen2011.org/>.

30. An expert from the United Kingdom reported on the activities of the Global Air Pollution (GAP) Forum and potential links to the Task Force, including a short report on the outcomes of the Air and Climate Workshop held in Gothenburg in October 2009.<sup>3</sup> The GAP Forum invited a representative of the Task Force to report its work and interests at the next GAP Forum meeting, to be held in June 2010 in Brussels, in conjunction with the Task Force on Hemispheric Transport of Air Pollution. The Task Force welcomed the contribution of the GAP Forum and agreed to that proposal.

## **IX. NATIONAL EXPERIENCES ON NITROGEN POLICIES**

31. An expert from the United Kingdom presented a short synthesis of the replies by the Parties to the Convention to the 2008 and 2006 Questionnaires on Strategies and Policies for Air Pollution Abatement, as an introduction to the work of breakout groups. Responses to the questions by the Parties varied greatly in terms of content and extent. Four breakout groups of the Task Force subsequently discussed the responses provided to four questions on the questionnaires in relation to commitments to implement National Codes of Agricultural Practice to reduce nitrogen oxide (NO<sub>x</sub>) emissions; commitments to implement National Codes of Agricultural Practice to reduce ammonia emissions; commitments to reduce ammonia emissions from manure spreading and urea fertilizer applications; and commitments to reduce ammonia emissions from manure housing and storage. A fifth group discussed implications for integrated approaches and potential future reporting strategies.

### **A. Experiences in implementing commitments to reduce Nitrogen Oxide (NO<sub>x</sub>) emissions**

32. An expert from the United Kingdom presented the conclusions of the breakout group, noting that analysis of the responses to the questionnaire was very difficult due to the vast differences in level of detail and scope of the responses provided by the different Parties. Nevertheless, the group concluded that the implementation of and knowledge regarding NO<sub>x</sub> emission control was far more mature than that for ammonia, based on the responses, including many references to the translation of requirements into EU and other national legislation. The group felt that more precise guidance in the questions could help in streamlining the responses to support intercountry comparisons.

### **B. Experiences regarding the commitment to implement National Codes of Agricultural Practice to reduce ammonia emissions**

33. An expert from Germany presented the findings of the breakout group, which highlighted that many Parties to the Gothenburg Protocol had not produced an unambiguously named code of practice, as required under annex IX. By contrast, several Parties had elements of ammonia codes embedded within several other codes of practice. The group concluded that national codes were essential for informing farmers about the necessity of and possibilities for ammonia

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<sup>3</sup> For further information on the workshop, held in October 2009, see <http://www.swedishepa.se/en/In-English/Menu/GlobalMenu/Conference-documentation/Intermediate-climate-policies/>.

emission abatement. The group also concluded that there was a need to improve transparency regarding who received the questionnaire and how it was processed by Parties.

**C. Experiences in implementing commitments to reduce ammonia emissions from manure spreading and urea fertilizer applications**

34. An expert from the United Kingdom reported the findings of the group. Many of the responses by Parties were found to be evasive or vague, without specifying the legislation to which they referred. The group also noted large differences between Parties in the implementation of measures in practice. The group suggested that the structure of the questions should be improved to ensure clearer answers by parties (e.g., inclusion of drop-down menus).

**D. Experiences with implementing commitments to reduce ammonia emissions from manure housing and storage**

35. An expert from Spain summarized the group discussions. The group found a lack of reliable common statistics, with different countries using different methods, which made it hard to make comparisons. A common database or a more structured approach to responses would be needed to achieve that. The group suggested an effort for coordinated educational plans that could be performed to improve compliance/implementation through a better understanding by practitioners on measures and environmental practices. The group concluded that a network of coordinated demonstration farms would be beneficial to promote on-farm application across all farm types.

**E. Experience in developing integrated approaches to nitrogen management**

36. An expert from Denmark reported the conclusions of the group on experience in developing integrated approaches for nitrogen management. With regard to the Netherlands, experiences with the farm-level nitrogen budget model (MINAS), which had been legally enforced from 1998 to 2003, though successful from the point of view of integrated nitrogen management, had been abandoned because of conflicting constraints and obligations related to the EU Nitrates Directive. In Denmark, a nitrogen balance was being used, where farmers could construct farm balances online. The group agreed that both farm-scale nitrogen balances and national-scale nitrogen budgets were needed to guide both farmers and policymakers in improving nitrogen management. The group considered that it should be mandatory to implement budgets on a national level, with a clear target for improving the environmental performance over time.

37. The Task Force agreed that reviewing the responses to the Questionnaires had been very informative and should be considered again in future by the Task Force. The information on the questionnaires, as well as the related replies and the review reports, should be more widely disseminated and made more transparent at the national level, as few experts attending the Task Force meeting had been aware of the questionnaire and the responses by their own countries.

## **X. 2010 WORK**

38. The Task Force took note of the successful fulfilment of its 2010 workplan items. It noted, in particular:

(a) Collaboration with the Task Force on Integrated Assessment Modelling in its work to derive aspirational targets (for 2050) for nitrogen emissions into the air and nitrogen depositions to land;

(b) Establishment of a Task Force subgroup of experts to look specifically at the effects of human diets on nitrogen pollution issues;

(c) Development of options for the revision of annex IX to the Gothenburg Protocol, and their subsequent delivery to the Working Group in Strategies and Review;

(d) Further work on updating the Guidance Document and providing links between it and proposed changes to annex IX;

(e) Progress in the development of national budgeting templates and systems. Steps to integrating nitrogen balances at the farm scale in view of nitrogen management options for annex IX and the Guidance Document.

(f) Further discussion on integrated nitrogen management approaches developed by Parties and providing technical and scientific information to support the revision of the Gothenburg Protocol in relation to managing the whole nitrogen cycle;

(g) Holding of its fourth annual meeting in April 2010, as well as plans to hold a fifth meeting in October 2010 specifically dedicated to the updating of annex IX of the Gothenburg Protocol and preparation of supporting documents (subject to agreement by the Executive Body Bureau to add the meeting to the Convention's list of meetings for 2010).

## **XI. FURTHER WORK**

39. The Task Force agreed on items for its draft 2011 workplan as follows:

(a) Continue improving coordination of activities across and outside the Convention and collaborate with subsidiary bodies under the Convention to complement the work of the subsidiary bodies of the Convention, in particular:

(i) Working with the International Cooperative Programme (ICP) on Modelling and Mapping of Critical Loads and Levels and Air Pollution Effects, Risks and Trends (ICP Modelling and Mapping), in particular on critical loads and dynamic modelling of nitrogen effects, including the development of indicators through the use of nitrogen budget approaches and links between nitrogen and climate;

(ii) With the Task Force on Emission Inventories and Projections, investigate holding a joint workshop on agricultural emissions and projections and continue ensuring

consistency between development of emission estimates and the estimation of efficiencies of agricultural emissions abatement;

(iii) With the Task Force on Integrated Assessment Modelling, participate in relevant meetings, in particular providing advice to avoid pollutant-swapping, and considering aspirational targets and effects of human behaviour, including dietary choices;

(b) Continue the work of the former Expert Group on Ammonia Abatement, develop technical and scientific information on an integrated approach to mitigation of agricultural nitrogen emissions with particular reference to the revision of the Gothenburg Protocol and, in

particular, finalize the update of the Guidance Document on Control Techniques for Preventing and Abating Emissions of Ammonia and work on updating the Framework Code on Good Agricultural Practice for Reducing Ammonia; inform the deliberations of the Working Group on Strategies and Review on revisions to annex IX to the Gothenburg Protocol; and take account of the relevant European Commission's reference documents on Best Available Techniques (BREFs);

(c) Continue providing technical information on making and using nitrogen budgets and estimating nitrogen emissions at various spatial scales and for various system boundaries;

(d) Continue developing and providing technical and scientific information to support the revision of the Gothenburg Protocol in relation to the whole nitrogen cycle;

(e) Request the national focal points to report their experiences, including any difficulties that they have in developing and implementing an integrated approach;

(f) Further consider the results from the European Nitrogen Assessment;

(g) Provide technical information on the effects of human diets on nitrogen use and emissions

(h) Prepare a special report on the interaction of reactive nitrogen and climate change, as requested by the Executive Body;

(i) Liaise with the Centre for Integrated Assessment Modelling (CIAM) to examine the costs and benefits of ammonia emissions abatement measures;

(j) Liaise with countries in Eastern Europe, the Caucasus and Central Asia in the development of approaches for managing reactive nitrogen in industry and agriculture;

(k) Prepare an informal document on the vision and future possibilities for integrating nitrogen management within the Convention and in relation to other UNECE and international conventions;

(l) Hold the Task Force's sixth meeting, tentatively scheduled to be held in May 2011, and submit its report.

## **Annex**

### **EXPLANATION OF AMENDMENTS TO THE OPTIONS FOR REVISION OF THE GOTHENBURG PROTOCOL, ANNEX IX**

1. Based on the feedback from the forty-sixth session of the Working Group and other considerations, the Task Force has further clarified and amended its earlier proposal to revise annex IX of the Gothenburg Protocol (ECE/EB.AIR/WG.5/2010/5). The present annex summarizes and explains the proposed amendments to the options for annex IX, which are reported in ECE/EB.AIR/WG.5/2010/14. This annex is supported by an informal draft of the updated Guidance Document, available on the website of the Working Group on Strategies and Review. In the following section, titles refer to the sections of the revised annex IX document (ECE/EB.AIR/WG.5/2010/14).

#### **A. Advisory code of good agricultural practice**

2. The Task Force agreed that the “UNECE Framework Code for Good Agricultural Practice For Reducing Ammonia” should include a section on low-emission manure processing and composting systems, as the importance of such systems was growing and those systems could be significant sources of ammonia emissions.

3. The Task Force agreed that codes of good agricultural practice for prevention of ammonia emissions had to be closely linked with other codes of good agricultural practice to ensure that interactions were considered fully and pollution swapping was prevented.

#### **B. Nitrogen management, taking into account the full nitrogen cycle**

4. The Task Force agreed on amending and simplifying the text presented in paragraph 4 of ECE/EB.AIR/WG.5/2010/5. The proposed farm-gate balances had to be based on easy-to-quantify external N inputs and outputs. The Task Force agreed on using these farm-gate balances especially on livestock farms, as the ammonia emissions abatement potential of nitrogen management on the basis of farm-gate balances was largest on livestock farms (and much less on arable farms). Further, the Task Force agreed on a five year period after the coming into force of the revised protocol for parties, so as to collect baseline data on current input-output balances of representative farming systems. The five-year period was intended to account for interannual variability. That change meant that the achievement of “improvement targets”, as specified in paragraph 4, applied at the earliest 10 years after the coming into force of the revised protocol.

5. The Task Force agreed on targets for both nitrogen surplus (nitrogen input-output balance) and nitrogen use efficiency. Those values were farm-system dependent and in part also interdependent, but there were benefits in using both indicators (targets). The nitrogen surplus expressed the loading of the environment with nitrogen per unit surface area (kg nitrogen per ha per year) whereas the nitrogen use efficiency expressed the efficiency by which food was produced on farms (kg nitrogen output per kg nitrogen input).

6. The Task Force agreed on the proposal to implement the measures for nitrogen input-output balances and nitrogen use efficiency on large farms at earliest 10 years after the entry into force of the revised protocol. The implementation of those measures on large farms had to be based on the experiences obtained on representative demonstration farms during the first 10 years.

7. Based on the guidance received from the Working Group on Strategies and Review at its forty-sixth session in April 2010, the Task Force had in its further work used livestock units (LU) rather than estimated nitrogen excretion during the housing period to set farm size thresholds. The use of livestock units had the advantage that it was consistent with EU reporting on farm size statistics. Where existing farm size thresholds were retained for pig and poultry, the units of animal places were retained for consistency with existing legislation.

8. The Task Force agreed on the proposal that for option A (high ambition), all livestock farms were included, with the exception of very small hobby farms of five or less livestock units. Under option B (medium ambition), an approach was taken that included 70 per cent of the European emissions from each of the cattle, pigs and poultry, giving equal attention to each sector. Based on that common target, thresholds were set at 50 livestock units for cattle, 200 livestock units for pigs (approximately equivalent to 400 sows) and 40,000 places for poultry. Under option C (low ambition), a threshold of 50 livestock units for cattle was combined with the existing thresholds for pigs in the Gothenburg Protocol and the EU Integrated pollution prevention and control (IPPC Directive) of 2,000 places for fattener pigs, 750 places for sows and 40,000 places for poultry. For discussion of the cattle threshold, see annex I to ECE/EB.AIR/WG.5/2010/4. For Option B, the lower threshold for pigs (covering 70 per cent of the European pig herd) was made bearing in mind that the existing Gothenburg Protocol/IPPC Directive thresholds for pigs only covered around 20 per cent of the European pig herd.

### **C. Livestock feeding strategies**

9. The Task Force agreed to change the specification of the farm size thresholds under options A, B and C, so as to be consistent with those proposed for nitrogen management as described above. The dates of implementation were similarly changed to account for the initial five-year period for collection of baseline data.

### **D. Animal housing**

10. In response to the request by the Working Group to clarify the thresholds for new animal housing, the Task Force agreed on the proposal to apply the emission reduction measures to all new animal houses, irrespective their size, as the measures for new houses would not lead to large differences between farms of different sizes in the costs per kilogram of nitrogen abated. The Task Force agreed that an exemption should apply for the smallest farms (including hobby farms) of five livestock units or fewer. The revised text also made it explicit that the paragraphs on new livestock housing applied to all new and largely rebuilt housing.

11. The Task Force agreed that the word “broilers” applied to all poultry for cooking, including chicken, turkeys, geese and other table birds. The differences in the specified

reductions for different management types related to the availability of the relevant technical measures, as outlined in the Guidance Document.

12. Based on the prioritization of measures and a desire to simplify the text, the Task Force agreed on combining the paragraphs for (a) sows and fattener pig housing into a single heading for all pig houses and (b) new or largely rebuilt housing for other livestock types into a single heading. Housing systems for these other livestock types (e.g., sheep, horses, buffalo, camels, minks, etc.) were estimated to account for less than 5 per cent of European ammonia emissions.

13. The Task Force noted that within EU member States the IPPC Directive was already in force, and applied to existing animal housing for large pig and poultry farms. Based on that consideration, the Task Force agreed to update the original provision for pig and poultry housing in annex IX to provide an option for existing animal houses. The proposed implementation time and annex IX note 2/ provided flexibility for countries in Eastern Europe, the Caucasus and Central Asia.

#### **E. Manure storage outside of animal houses**

14. The Task Force agreed to amend the text so as to make it clear that the measures applied to slurry stores outside of animal housing. On technical grounds, the measures applied to all slurry stores and all animal categories. Option B was now listed with a delayed implementation time.

15. The Task Force agreed to include a new paragraph to highlight that, for solid manure outside of animal housing, Parties should use low emission systems as far as they considered it feasible. New data were available showing that closely covering farmyard manure stores with plastic sheeting significantly reduces ammonia emissions with no significant pollution swapping issues for nitrous oxide or methane. That measure was especially applicable to manure heaps that had been completed (did not receive daily additions). That measure would be described further in the revised Guidance Document.

##### **(a) Manure processing and composting**

16. Given the increasing importance of manure processing and composting (especially in organic farming) and the significant ammonia emissions associated with some manure processing and composting installations, the Task Force agreed to include a new provision for low-emission manure processing and composting systems, as far as the Party considered it feasible. Indirectly, that provision also highlighted the need for further developments in the area, as described in the Guidance Document.

#### **F. Manure application**

17. The main request from the Working Group for this topic was that the Task Force clarified more precisely under which conditions the measures applied. The Task Force agreed that the provision applied to the land application of all slurry and solid manure from all livestock types to both arable and grassland. The basic structure of the tables had been further clarified to

emphasize the default mandatory requirement followed by specified relaxations or exemptions.

18. The Task Force agreed to maintain the relaxation of the 60 per cent reduction target under option A for steeply sloping fields (>15%). It was noted that in certain landscapes the farmer only had access to steeply sloping fields and that removal of that exemption under option A could provide an obstacle to the farmer making use of the manure. The Task Forces also noted that application of slurry on sloping fields might contribute to run-off and contamination of water bodies, and that application of manure to such fields was not recommended.

19. The Task Force agreed to include a new exemption under option B for the smallest farms of five or less livestock units, which applied to slurry and manure of all animal types. That exemption would have little effect on total emissions, while avoiding requirements for the many small farmers in some countries. Based on cattle farms in the EU (annex I to ECE/EB.AIR/WG.5/2010/4), farms below the threshold were estimated to represent less than 5 per cent of the animals, but more than 30 per cent of farms.

20. The Task Force agreed to add under options B and C an additional exemption for small mobile slurry tankers and manure spreaders. Tanker and spreader size provided a simple indirect indicator of farm size, which did not require information to be collected on whether farms were above or below specified thresholds. For option B, only existing tankers and spreaders would be exempted with less than 3 cubic-metre capacity. For option C, both new and existing tankers and spreaders would be exempted with less than 5 cubic-metre capacity. Most slurry and solid manure in Europe was applied with tankers and spreaders of much larger size (larger than 8–10 cubic metres), especially when spread by contractors. Those thresholds for tanker/spreader size were set to exclude the smallest farms only, accounting for a small fraction of total ammonia emissions, but a significant number of farmers. Varying the tanker/spreader size threshold (of existing and/or new equipment) for low-emission requirements could also provide an additional approach to tuning ambition levels.

#### **G. Urea-and ammonium-based fertilizers**

21. The Task Force agreed to maintain the provisions for this section as in the last version presented by the Task Force (ECE/EB.AIR/WG.5/2010/5), pending documentation of further evaluations and fertilizer trials.

#### **H. Reporting requirements**

22. The Task Force agreed to maintain the provisions for this section as in the last version presented by the Task Force (ECE/EB.AIR/WG.5/2010/5).

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