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**Progress in the implementation of the 2014-2015 workplan**

### Report by the Task Force on Reactive Nitrogen\*

#### *Summary*

The present report by the Task Force on Reactive Nitrogen contains the outcomes of its ninth meeting held on 25 and 26 March 2014 in Madrid. It summarizes the outcomes of the work of the Task Force during the period 2014-2015 in accordance with its assigned deliverables as outlined in the Convention's work plan (ECE/EB.AIR.122/Add.2) and the Long-term Strategy (ECE/EB.AIR/106/Add.1).

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\* The present document is being submitted without formal editing.

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## Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction.....	1–6	3
A. Attendance.....	2	3
B. Organization of work.....	3–6	3
II. Summary of the ninth meeting of the Task Force on Reactive Nitrogen .....	7–12	4
III. Progress in the implementation of the 2014-2015 workplan (ECE/EB.AIR.122/Add.2)	13–29	5
A. Finalising the guidance document on preventing and abating ammonia emissions from agricultural sources (ECE/EB.AIR/120) (workplan item 2.3.1) .....	13–15	5
B. UNECE framework code for good agricultural practice for reducing ammonia (EB.AIR/WG.5/2001/7) (workplan item 2.3.3).....	16–19	6
C. Guidance document on national nitrogen budgets (ECE/EB.AIR/119) (workplan item 2.3.2, 2.3.5, 2.3.9) .....	20–22	7
D. Nitrogen mitigation through behavioural change (workplan item 2.3.10).....	23–25	7
E. International framework for nitrogen management (workplan item 2.3.7) ....	26–29	8
IV. Policy relevant issues, findings and recommendations .....	30	8

## **I. Introduction**

1. This report, prepared in cooperation with the secretariat to the Convention on Long-range Transboundary Air Pollution, describes the results of the ninth meeting of the Task Force on Reactive Nitrogen, held on 25 and 26 March 2014 in Madrid. The background documents and presentations made during the meeting and the reports presented can be accessed at: <http://www.clrtap-tfrn.org/tfrn-9>.

### **A. Attendance**

2. The ninth meeting of the Task Force (and associated meetings) was attended by fifty persons from sixteen countries, and included representatives of the Centre for Integrated Assessment Modelling, the Task Force on Emissions Inventories and Projections, the Ministry of Food, Agriculture and Environment of Spain, the Federal Environment Agency of Germany and several members of the European Integrated Pollution Prevention and Control Bureau of the European Commission.

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

3. The ninth meeting of the Task Force was co-chaired by Mr. T. Dalgaard (Denmark) and Mr. M. Sutton (United Kingdom). It was hosted by Spain, with support from the Government of the United Kingdom of Great Britain and Northern Ireland (Department for Environment, Food and Rural Affairs), the Government of Denmark (Ministry of Environment and Ministry of Food, Agriculture and Fisheries), Spain (Technical University of Madrid, with input from the Ministry of Environment, Food and Agriculture) and the European Commission (EC) (through the project “Effects of Climate Change on Air Pollution and Response Strategies for European Ecosystems” (ECLAIRE)), including financial support from the United Kingdom for the participation of five experts from the Russian Federation and Ukraine, including the two co-chairs of the Expert Panel on Nitrogen in countries of Eastern Europe, the Caucasus and Central Asia, together with the provision of simultaneous interpretation facilities. The delegates were able to contribute to the main Task Force meeting, as well as the Expert Panel on the Mitigation of Agricultural Nitrogen and the Expert Panel on Nitrogen Budgets, including a special training workshop on dynamic nitrogen budgets which was held on 27 March 2014 in Madrid and for which information is available at: <http://www.clrtap-tfrn.org/tfrn-9>.

4. In addition, a workshop has been held jointly with the Government of the United Kingdom (on behalf of the Atlantic Region Natura seminar) on ‘Nitrogen deposition and the Nature Directives’ from 2 to 4 December 2013 in Peterborough for which background documents can be accessed at: <http://jncc.defra.gov.uk/page-5954>. Among other tasks, the workshop analysed the progress made by countries in reducing nitrogen emissions to reduce threats to the Natura 2000 network of Special Areas of Conservation in the Atlantic region of the European Union. Examples of best practices in mitigation methods were highlighted. While wide successes were recognized in reducing nitrogen oxides emissions, the discussions noted that only countries with a clear regulatory framework in place had been successful in achieving substantial reductions in ammonia emissions over the last decade.

5. Furthermore, an expert workshop on ‘Economy-wide nitrogen balances and indicators’ was organised with the Organisation for Economic Co-operation and Development (OECD) from 31 March to 1 April 2014 in Paris.

6. Among others, the Task Force is currently building its collaborative links with the following organizations: United Nations Environment Programme (UNEP), including the Global Environment Facility (GEF). The United Nations Economic Commission for Europe (ECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) together with the regional marine conventions, including the Baltic Marine Environment Protection Commission - Helsinki Commission (HELCOM), the Convention for the Protection of the marine Environment of the North-East Atlantic (OSPAR) and the Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention), the UNEP hosted Global Programme of Action for the Protection of the Marine Environment from Land-based Activities and the Global Partnership on Nutrient Management, the United Nations Convention on Biological Diversity, the European Commission, OECD, the Agriculture Initiative of the Climate and Clean Air Coalition, the Global Air Pollution Forum, the International Nitrogen Initiative.

## **II. Summary of the ninth meeting of the Task Force on Reactive Nitrogen**

7. The development of a draft report on integrated approaches for nitrogen emission abatement policy was discussed. In particular, it was noted that the short-list of five priority actions to reduce ammonia emissions (as reported by the Task Force to the Working Group on Strategies and Review, ECE/EB.AIR/WG.5/2011/16, paragraph 16) had been welcomed and that there would be interest from food retail groups and others to further develop such an approach considering a full nitrogen perspective.

8. The Task Force noted the contribution made by the 2013 report 'Our Nutrient World'<sup>1</sup> which had been prepared by the Global Partnership on Nutrient Management in cooperation with the International Nitrogen Initiative, and which was led by Mr. M. Sutton, one of the co-chairs of the Task Force. In particular, that report had outlined ten broad areas ("Key Actions") for better nitrogen management which would form the starting point to develop a "Nitrogen Top-10" of specific practical and cost-effective options to reduce nitrogen pollution while maximizing the green economy benefits.

9. It was agreed to take forward this work in 2014 and 2015, for which resources would be sought, with the planned "Nitrogen Top-10" being disseminated widely through the web, leaflets and through direct engagement with the agri-food sector.

10. A presentation by a representative of the Ministry of Agriculture, Food and Environment of Spain discussed initiatives to decrease the use of inorganic fertilisers including improving the use of organic manures and assessing farms for the availability of enough land to use the manures being produced locally. A presentation was also given on Portugal which provided a good overview of the nitrogen issue in water and the atmosphere

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<sup>1</sup> 'The challenge to produce more food and energy with less pollution' (Sutton M.A., Bleeker A., Howard C.M., Bekunda M., Grizzetti B., de Vries W., van Grinsven H.J.M., Abrol Y.P., Adhya T.K., Billen G., Davidson E.A., Datta A., Diaz R., Erisman J.W., Liu X.J., Oenema O., Palm C., Raghuram N., Reis S., Scholz R.W., Sims T., Westhoek H. & Zhang F.S., with contributions from Ayyappan S., Bouwman A.F., Bustamante M., Fowler D., Galloway J.N., Gavito M.E., Garnier J., Greenwood S., Hellums D.T., Holland M., Hoysall C., Jaramillo V.J., Klimont Z., Ometto J.P., Pathak H., Plocq Fichelet V., Powlson D., Ramakrishna K., Roy A., Sanders K., Sharma C., Singh B., Singh U., Yan X.Y. & Zhang Y. (2013) Our Nutrient World: The challenge to produce more food and energy with less pollution. Global Overview of Nutrient Management. Centre for Ecology and Hydrology, Edinburgh on behalf of the Global Partnership on Nutrient Management and the International Nitrogen Initiative. 114 pp. <http://initrogen.org/index.php/publications/our-nutrient-world/>).

and highlighted that previous decreases in fertiliser usage were due to decreases in production. Nitrate pollution zones are also currently increasing in size.

11. The co-Chair of the Expert Panel on the Mitigation of Agricultural Nitrogen, Mr. S. Bittman (Canada) provided a presentation on the current situation regarding nitrogen management in Canada, where there are no regulations for ammonia. It was interesting to note that there have been increases in the use of low emission spreading machinery, not for pollution reduction reasons, but because farmers could claim the purchase costs for tax reduction purposes. The presentation also highlighted the importance of timing in emission reductions, to take account of precipitation, wind direction and speed etc.

12. Further presentations were given by presenters from the Czech Republic, the Russian Federation and Ukraine. In the Russian Federation, the fertiliser production levels have increased as they are now exporting to other countries, while domestic fertiliser use remains very low (less than one fifth of exports). A Russian nitrogen balance case study was also presented. A Ukrainian perspective was given on the requirements for livestock in the context of the Convention on Long-range Transboundary Air Pollution and that of the United Nations Framework Convention on Climate Change (UNFCCC) and it was noted that the development of techniques differs from implementation, as was the case for many other countries.

### **III. Progress in the implementation of the 2014-2015 workplan (ECE/EB.AIR.122/Add.2)**

#### **A. Finalising the guidance document on preventing and abating ammonia emissions from agricultural sources (ECE/EB.AIR/120) (workplan item 2.3.1)**

13. The Task Force, with the support of the Expert Panel on Mitigation of Agricultural Nitrogen, liaised with the ECE secretariat on the finalization of the guidance document on preventing and abating ammonia emissions from agricultural sources (Ammonia guidance document) (ECE/EB.AIR/120) following its adoption by the Executive Body at its thirty-first session in December 2012. The title of the print document was chosen as “Options for Ammonia Mitigation: Guidance from the UNECE Task Force on Reactive Nitrogen” and it was published in March 2014 in English by the United Kingdom Centre for Ecology and Hydrology on behalf of the Task Force. Based on finalization of the translation, a printed version in Russian is currently in preparation for publication during 2014.

14. The Task Force recognized that such a printed version of the Guidance Document provides a key resource for dissemination to stakeholders on ammonia mitigation. In so doing it raises the profile of the work and also gives credit to named authors who mostly provided their input without financing (national contributions-in-kind). The Task Force recognized that this named attribution is an important part of the strategy to encourage contributions-in-kind to the work of the Task Force.

15. One thousand hardcopy versions of the Ammonia Guidance Document were printed in advance of the ninth meeting of the Task Force, at which 300 copies were distributed. A printed copy of the Russian translation is in preparation.

**B. UNECE framework code for good agricultural practice for reducing ammonia (EB.AIR/WG.5/2001/7) (workplan item 2.3.3)**

16. A draft version of the revised UNECE framework code for good agricultural practice for reducing ammonia (ammonia framework code) was presented to the Task Force by the chairs of the Expert Panel on the Mitigation of Agricultural Nitrogen with the work supported by a financial contribution from Germany. It is planned to provide an executive summary with key messages and update to the Executive Body in December 2014. However, based on the resources currently available to the Expert Panel partners, it is planned that the final proposed revision of the ammonia framework code would be provided to the Working Group on Strategies and Review in 2015 for approval and adoption by the Executive Body in 2016. Should an earlier completion date be needed to allow reference to the document in the revised National Emissions Ceilings Directive (NEC Directive), then additional financial resources would need to be provided to the Task Force to allow the Expert Panel to accelerate its work. Due to the importance of this document the Task Force plans to maintain and update the content of the ammonia framework code (after its completion in 2015) as emerging comments and developments arise as much as is possible with respect to resource availability.

17. The Task Force noted that the substantial use made in annex III of the European Commission (EC) proposal of the revision of the NEC Directive of documents prepared by the Task Force, namely the ECE ammonia guidance document, the ECE guidance document on national nitrogen budgets (ECE/EB.AIR/119) and the ECE ammonia framework code. Specifically, the Task Force noted that the proposals for technical measures in annex III of the NEC Directive revision drew on options for a mid/low level of technical ambition, as already provided by the Task Force in its presentation of options (in particular options B and C) for the revision of annex IX of the Gothenburg Protocol, (ECE/EB.AIR/WG.5/2011/16). The inclusion of these options in annex III is therefore considered to be well justified from a technical and economic perspective and would provide a key element to meeting the proposed national emissions ceilings.

18. Engagement with the European Union Best Available Techniques Reference (BREF) revision process for the pig and poultry sector has been ongoing. This has been facilitated by the involvement of the co-Chair of the Expert Panel on the Mitigation of Agricultural Nitrogen, Mr. M. Dedina and other members. Further improvement in common understanding of the complementary nature of the ECE and EC processes were developed at the ninth meeting of the Task Force (and the associated Expert Panel on Agricultural Nitrogen), where EC representatives of the BREF process (Joint Research Centre-Seville) presented and joined in the discussions related to the updating of the ammonia framework code.

19. The Task Force noted that options for an air quality objective/limit value for ambient ammonia concentrations had not been incorporated into the EC's air quality package. The Task Force expressed a willingness to further develop the options in support of the work within the Convention noting that the benefits and opportunities of an ammonia air quality value had earlier been highlighted as part of a workshop held in Brussels in 2009 entitled "Nitrogen Deposition and Natura 2000"<sup>2</sup> as well as in the recent "Saltsjobaden 5"<sup>3</sup> workshop which took place in Gothenburg, from 24 to 26 June 2013. Such a limit value

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<sup>2</sup> Results of the workshop are available in chapter 7, Hicks et al., 2011 and at: <http://cost729.ceh.ac.uk/n2kworkshop>).

<sup>3</sup> Results are available in chapter 3.2 in Grennfelt et al., 2013 and at: <http://saltsjobaden5.ivl.se/download/18.372c2b801403903d275747b/1383119195373/Saltsjobaden+V.pdf>.

could provide a key tool to support protection of natural ecosystems across the European Union, which could especially focus on meeting existing biodiversity commitments (e.g. Natura 2000 network).

### **C. Guidance document on national nitrogen budgets (ECE/EB.AIR/119) (workplan item 2.3.2, 2.3.5, 2.3.9)**

20. The Expert Panel on Nitrogen Budgets, focused on developing the supporting annexes of the guidance document and on demonstrating the budget application for selected countries, including Austria, Canada and Switzerland. In addition, a tool for making an existing national nitrogen budget dynamic was designed, implemented (preliminary version) and tested for a reduced version of Switzerland's nitrogen budget.

21. The Task Force has continued to work in partnership with the OECD towards the harmonization of national nitrogen budget approaches, with a proposal to extend the OECD soil nitrogen balance approach. At the expert workshop on 'Economy-wide nitrogen balances and indicators' organised jointly with OECD and held from 31 March to 1 April 2014 in Paris, national experts and Task Force representatives, agreed to continue the development of simple headline indicators that could be easily derived from national nitrogen budgets. The option to report full-chain Nitrogen Use Efficiency (NUE) (nitrogen output versus input ratio), as originally proposed in the publication 'Our Nutrient World', is now being further refined and considered as a possible future headline indicator. It is planned to further address component efficiency indicators as part of the International Nitrogen Management System (INMS, see paragraph 26) project (initial outcomes expected from 2016). Additional resources would be needed if earlier products are requested.

22. The emphasis on overall improvement in NUE was recognized in the report "Drawing down N<sub>2</sub>O to Protect Climate and the Ozone Layer" published by the UNEP with the support of Task Force (<http://www.unep.org/pdf/UNEPN2Oreport.pdf>). The report, which was launched in November 2013 during the nineteenth Conference of the Parties to the UNFCCC, highlighted the need for a joined strategy to reduce nitrous oxide emissions that linked nitrogen efficiency improvements in agriculture, technical measures in industry, reducing consumption of meat and dairy products, reducing food waste and food losses, and reducing losses from wastewater and biomass burning.

### **D. Nitrogen mitigation through behavioural change (workplan item 2.3.10)**

23. Through its Expert Panel on Nitrogen and Food the Task Force is now preparing to publish its results on how behavioural change in relation to food choice can complement nitrogen mitigation actions based on technical measures in the food chain, including the potential impact of several scenarios of dietary change. A paper<sup>4</sup> on key messages published in spring 2014 will be supported by launch of the full report as a Special Report of the European Nitrogen Assessment in summer 2014.

24. The results of the analysis, conducted at a European Union scale, show how food choice is an extremely powerful driver. Scenarios considering a 25 per cent or 50 per cent reduction of the consumption of different livestock products (meat, dairy) were considered. The analysis showed that a 50 per cent reduction of all meat and dairy products would reduce nitrogen pollution levels (ammonia, nitrates and nitrous oxide emissions) by around

<sup>4</sup> (Westhoek, H., Lesschen, J.P., Rood, T., Wagner, S., De Marco, A., Murphy-Bokern, D., Leip, A., van Grinsven, H., Sutton, M.A., & O. Oenema (2014) Food choices, health and environment: Effects of cutting Europe's meat and dairy intake. Global Environmental Change).

40 to 45 per cent, while giving similar reductions in methane and agricultural carbon dioxide emissions. At the same time, substantial areas of agricultural land would be freed up to allow crop exports or increases in bioenergy production. The 50 per cent scenario was found to reduce average intake of red meat from 207 per cent to 107 per cent of recommended mean daily intake.

25. Following the planned launch of the Expert Panel on Nitrogen and Food report it is anticipated that the work of the panel needs to increasingly address the links between biogeochemistry-environment and diet-health expert communities, as well as actors in the food production and sales sector, especially in relation to understanding and addressing the barriers to behavioural and sectoral change. Parties, which consider supporting this challenge, are invited to contact the Task Force co-Chairs.

#### **E. International framework for nitrogen management (workplan item 2.3.7)**

26. A proposal to GEF in partnership with UNEP and the International Nitrogen Initiative has now been approved by the GEF Council, allowing the work to proceed to Project Preparation Grant phase for the project “Targeted Research for improving understanding of the Global Nitrogen Cycle, towards the establishment of an International Nitrogen Management System (INMS)”. The project combines global analysis with regional demonstration activities, including financial support for regional demonstration actions in Eastern Europe, the Caucasus and Central Asia which is expected to significantly strengthen implementation and ratification in these countries. Following the Project Preparation Grant phase, it is anticipated that the project would run between 2015 and 2019.

27. The shortlist of demonstration regions is currently being outlined, with proposals for demonstration regions supported by GEF in the ECE region including North-East Baltic (Estonia, Latvia and the Russian Federation), Dnieper (Belarus, the Russian Federation and Ukraine), together with an Atlantic demonstration region (Belgium, France, Portugal, Spain and the United Kingdom of Great Britain and Northern Ireland), supported by existing EC project funds. The selection of these demonstration regions would allow links to be developed with the ECE Water Convention and the regional marine conventions, including HELCOM, OSPAR and the Bucharest Convention. Central Asia (Fergana valley and Upper Syr Darya, including Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan) has been highlighted as an area of interest for preparatory studies to support future demonstration.

28. Options for collaborative regional demonstration in the INMS project beyond the ECE region include South Asia (including Bangladesh, India, Nepal and Sri Lanka), East Asia (China, Japan, the Philippines and the Republic of Korea), the Lake Victoria catchment (Kenya, Tanzania and Uganda) and Latin America.

29. As the Project Preparation Grant phase of the project develops, Parties and other donors are invited to contribute funds to support the development of the INMS process. GEF sees its investment (planned 6 million USD) as being catalytic to stimulating substantial further regional and global investment. Enquiries regarding the INMS preparation should be directed to the Task Force (tfrn@ceh.ac.uk).

### **IV. Policy relevant issues, findings and recommendations**

30. The Task Force noted:

(a) The emerging finding from the ongoing work on the valuation of ecosystem damage arising from nitrogen to air pollution and the integration of these costs into model



chains conducted with the support of the ECLAIRE project (the European Union's Seventh Framework Programme for Research) is that future climate change is expected to increase ammonia emissions (see Special Issue of Philosophical Transactions of the Royal Society, 2013 on the Global Nitrogen Cycle – paper by Sutton et al.<sup>5</sup>). This finding means that the actions as outlined in annex III of the proposal for revising the NEC Directive are expected to be even more important if overall ammonia emissions and their associated environmental and health effects are to be reduced.

(b) That if required by Parties, exceptions to the requirements for small farms (e.g. with a specific definition, such as less than 50 livestock units; and for small mobile manure spreaders, less than 5 m<sup>3</sup> volume) could provide a cost effective way to focus abatement measures in the most cost-effective situations (e.g. addressing 70 per cent of cattle ammonia emissions based on measures with approximately 12 per cent of cattle farms) (see annex I to document 'Options for revising the Gothenburg Protocol' (ECE/EB.AIR/WG.5/2010/4)).

(c) That future autonomous changes are likely to increase the fraction of animals on medium and large farms (e.g. >50 livestock units).

(d) That there is now increased scientific attention being given to the spatial aspects of improving Nutrient Use Efficiency (NUE), where limits on maximum nutrient input rates or maximum densities of livestock may act to help prevent local manure surpluses that contribute to poor NUE, and encourage mixed farming systems (livestock with adjacent arable farming) that can help improve NUE and reduce ammonia and other nitrogen losses.

(e) That the options for setting an ambient ammonia concentration limit/objective value need to be further considered, especially in relation to meeting the existing commitments to protect biodiversity across the European Union and ECE region (see paragraph 19).

(f) That the importance and the difficulty in obtaining more widespread and standardised farm level activity and management data should be further considered as this represents a key limitation to improving regional estimates of emissions and the emission reductions achieved by Parties.

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<sup>5</sup> Sutton M.A., Reis R., Riddick S.N., Dragosits U., Nemitz E., Theobald M.R., Tang Y.S., Braban C.F., Viero M., Dore A.J., Mitchell R.F., Wanless S., Daunt F., Fowler D., Blackall T.D., Milford C., Flechard C.F., Loubet B., Massad R., Cellier P., Coheur P.F., Clarisse L., van Damme M., Ngadi, Y., Clerbaux C., Skjøth C.A., Geels C., Hertel O., Wichink Kruit R.J., Pinder, R.W., Bash J.O., Walker J.D., Simpson D., Horvath, L., Misselbrook, T.H., Bleeker A., Dentener F. & Wim de Vries V. (2013) Toward a climate-dependent paradigm of ammonia emission & deposition. *Phil. Trans. Roy. Soc. (Ser. B)*. 368: 20130166. <http://dx.doi.org/10.1098/rstb.2013.0166>.