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Working Group on Strategies and Review

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Item 3 of the provisional agenda
Progress in the implementation of the 2020–2021 workplan

Report of the Task Force on Reactive Nitrogen*

Summary

At its twenty-fifth session (Geneva, 10–13 December 2007), the Executive Body for the Convention on Long-range Transboundary Air Pollution established the Task Force on Reactive Nitrogen. In accordance with its revised mandate set out in the annex to decision 2018/6, the Task Force is required to report on progress in its work to the Working Group on Strategies and Review.

The present report of the Task Force presents the outcomes of its fifteenth meeting (online, 4 February 2021) and summarizes the progress in the implementation of the 2020–2021 workplan for the implementation of the Convention (ECE/EB.AIR/144/Add.2).

* The present document is being issued without formal editing.

I. Introduction

1. The present report presents the outcomes of the fifteenth annual meeting of the Task Force on Reactive Nitrogen (online, 4 February 2021). The report also summarizes the progress of the Task Force in implementing the 2020–2021 workplan for the implementation of the Convention (ECE/EB.AIR.144/Add.2).

II. Fifteenth annual meeting of the Task Force on Reactive Nitrogen

A. Organization of work

2. The meeting was attended by 85 experts from 25 countries, including those from national authorities, universities and research institutes. The meeting was Co-chaired by Mr. Mark Sutton (United Kingdom of Great Britain and Northern Ireland), Ms. Cláudia Marques dos Santos Cordovil (Portugal) and Mr. Tommy Dalgaard (Denmark).

3. The agenda of the meeting included the following items:

(a) Introduction, including a statement on the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol);

(b) Presentation and discussion on the Gothenburg Protocol review process;

(c) Update from the Expert Panel on Mitigating Agricultural Nitrogen;

(d) Update from the Expert Panel on Nitrogen Budgets;

(e) Update from the Expert Panel on Nitrogen and Food;

(f) Update from the Expert Panel on Nitrogen in Countries of Eastern Europe, the Caucasus and Central Asia;

(g) Presentation on the draft ammonia assessment report;

(h) Meeting closure, including an update on national ammonia codes;

4. The costs of organization of the meeting were covered by the United Kingdom of Great Britain and Northern Ireland.

B. Summary of the main discussion points

5. The Vice-Chair of the Working Group on Strategies and Review from Germany informed participants about the progress in preparing the annotated outline of the review report by the Gothenburg Protocol review group. The Task Force agreed on the organisation of a meeting in mid-March 2021 to specifically discuss the review of the Gothenburg Protocol. It was noted that a critical way for the Task Force to engage with the review process was to provide answers to the questions set out in annex I to document ECE/EB.AIR/2020/3−ECE/EB.AIR/WG.5/2020/3 entitled Preparations for the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone as amended in 2012.

6. The Co-chairs of the Expert Panel on the Mitigation of Agricultural Nitrogen noted the importance of linking national inventories and abatement data in the form of emission factors in order to evaluate and invest in measures that produced the most impact. The experts highlighted potential new technology and research in order to help track the efficacy of mitigation efforts around the globe, as well as to validate the quantities of emissions being reported as part of national inventories.

7. The experts of the Expert Panel on Mitigation of Agricultural Nitrogen discussed the importance of keeping information valid and current through continued co-operation with partners and reviewing of guidance documents. The experts specifically noted the partnerships with the database on measures that was being developed under the project

"Towards INMS[1]" as well as the clearing house of control technologies[2] maintained by the Task Force on Techno-economic Issues. They acknowledged the need to review the Guidance document on preventing and abating ammonia emissions from agricultural sources (ECE/EB.AIR/120)[3] (the ammonia guidance document) to ensure that relevant information was maintained and updated.

8. The Co-chair from the United Kingdom drew attention to the Guidance document on integrated sustainable nitrogen management (ECE/EB.AIR/2020/6–ECE/EB.AIR/WG.5/2020/5) prepared by the Task Force and adopted by the Executive Body at its fortieth session (18 December 2020). He explained that the document could be considered as complementary to the ammonia guidance document. Whereas the Guidance document on integrated sustainable nitrogen management provided an overview for all forms of nitrogen, the ammonia guidance document provided substantial detail for abating ammonia from agricultural sources, representing the leading international reference on this topic.

9. The Co-chairs of the Expert Panel on Nitrogen Budgets provided an update with respect to the implementation of the Guidance document on national nitrogen budgets (ECE/EB.AIR/119). They noted that all annexes to the Guidance document were completed with the exception of the annex on waste due to a continued lack of resources and complications arising due to the COVID-19 crisis. The experts also noted that the newly added annex on the energy sector was available for use.

10. The experts of the Panel on Nitrogen Budgets highlighted that the work of the Panel had been compared to other country data on a global scale through the continued partnership with the project "Towards INMS", and that discussions were underway to host a platform for nitrogen budgets through this project.

11. The Co-chairs of the Expert Panel on Nitrogen and Food provided an update on the second special report of the European Nitrogen Assessment on nitrogen and food entitled Appetite for change: food options for nitrogen, environment and health. A summary of the key emerging messages of that report are annexed to the present document. An advance draft of the report will be submitted as an informal document to the Working Group on Strategies and Review at its fifty-ninth session. The experts noted that the second special report would assess the combination of improved farm level technical measures and shifts in consumption in greater depth. This was considered along with the relative potential of dietary changes and food waste reduction, the health effects of a range of dietary patterns that generated less nitrogen pollution and the role of science in strengthening the case for controlling nitrogen pollution and optimising diets to meet human health goals.

12. The Co-chairs of the Expert Panel on Nitrogen in Eastern Europe, the Caucasus and Central Asia provided an update on continued measurements of the application of nitrogen fertilisers and the nitrogen balance in the cultivation of key agricultural crops in the Russian Federation. The experts also outlined progress made in key multi-country programmes, infrastructure projects and in the development of interactive monitoring tools. The Expert Panel highlighted the workshops and training on emissions inventories organized by the secretariat in Eastern Europe, the Caucasus and Central Asia and provided an update on the current ratification status of countries with respect to the Gothenburg Protocol.

13. The Task Force discussed the draft ammonia assessment report (ECE/EB.AIR/WG.5/2021/7, forthcoming), which was being finalised for submission to the Working Group on Strategies and Review. The Task Force Co-chairs welcomed the draft report on behalf of the Task Force.

[1] International Nitrogen Management System. The project "Towards INMS" is implemented by the United Nations Environment Programme with funding through the Global Environment Facility and executed through the Natural Environment Research Council (United Kingdom) with its Centre for Ecology and Hydrology.

[2] See https://tftei.citepa.org/en/clearing-house.

[3] Updated edition published as "Options for Ammonia Abatement: Guidance from the UNECE Task Force on Reactive Nitrogen" (Bittman et al., 2014). See http://www.clrtap-tfrn.org/content/options-ammonia-abatement-guidance-unece-task-force-reactive-nitrogen.

14. The Task Force noted that a questionnaire had been sent to Parties to the Gothenburg Protocol to assess the development and implementation of national ammonia codes. The questionnaire was to be delivered by the Parties by the 30 April 2021 to inform the Working Group on Strategies and Review at its fifty-ninth session.

III. Progress in the implementation of the 2020–2021 workplan for the Convention[4]

15. The present section contains a summary of the results of the review of progress in activities outlined in the 2020–2021 workplan by workplan item.

Item 1.1.3.3: Ammonia assessment report in 2020

16. At the request of the Executive Body, the Task Force on Reactive Nitrogen and the Task Force on Measurements and Modelling under the coordination of the Task Force on Integrated Assessment Modelling elaborated a concise policy-oriented overview of the key research and findings on ammonia in the assessment report on ammonia.

Item 2.1.8: Carrying out tasks specified in the mandate

17. The Task Force continued to contribute and support the efforts to reduce the air pollution in context of the nitrogen cycle, by developing technical and scientific information. The Expert Panels continued to provide technical information on their respective areas of action. It was highlighted that the book "Just Enough Nitrogen: Perspectives on how to get there for regions with too much and too little nitrogen" (eds. Sutton et al., 2020, Springer) had been published by the Co-chair of the Task Force, and included several Task Force relevant chapter contributions.

Item 2.1.9: Input provided to support the review of the Gothenburg Protocol

18. The Task Force was represented in the Gothenburg Protocol review group by its Co-chair from the United Kingdom to contribute to the elaboration of Preparations for the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone as amended in 2012 (ECE/EB.AIR/2020/3−ECE/EB.AIR/WG.5/2020/3), following Executive Body decision 2019/4. The document was considered by the Working Group on Strategies and Review and the Executive Body at their fifty-eighth (14, 15 and 17 December 2020) and fortieth sessions, respectively.

19. The Co-chairs of the Task Force on Reactive Nitrogen, the Task Force on Integrated Assessment Modelling and members of the Gothenburg Protocol review group prepared an informal document "Considerations for ammonia relevant to future review of the Gothenburg Protocol", which was presented to the Working Group on Strategies and Review at its fifty-eighth session. The document summarized the available documentation on ammonia relevant for the on-going review of the Gothenburg Protocol. On behalf of the Task Force, the Co-chair from the United Kingdom, when presenting the document, drew particular attention of participants to footnote 13 of that document which summarized the multiple versions and options for revision of annex IX to the Gothenburg Protocol, which were provided as part of previous review of the Protocol. He proposed that note be taken of those existing documents as part of the review of the Gothenburg Protocol.

Item 2.2.2: Guidance on reduction of emissions from agricultural residue burning

20. A draft report on agricultural residue burning is under preparation under the lead of the Task Force on Technical and Economic Issues. The Task Force Co-chairs propose to invite the lead authors to present their work at a future meeting of the Task Force on Reactive Nitrogen in order to consider possible interactions with integrated sustainable nitrogen management.

[4] In several cases, the titles in this section abbreviate or summarize much longer workplan items. For the full text of each item, see ECE/EB.AIR/144/Add.2.

Item 2.2.3: Guidance document on integrated sustainable nitrogen management

21. The Guidance document on integrated sustainable nitrogen management (ECE/EB.AIR/2020/6–ECE/EB.AIR/WG.5/2020/5) was presented by the Task Force to the Working Group on Strategies and Review and the Executive Body at their fifty-eighth and fortieth sessions, respectively. Upon consultation, the document was adopted by the Executive Body by its decision 2020/1 (ECE/EB.AIR/146, annex I).

Annex

Summary of emerging messages of the European Nitrogen Assessment second special report on nitrogen and food entitled Appetite for change: food options for nitrogen, environment and health.

1. This annex summarizes messages emerging from the draft special report, currently being finalized by the Expert Panel on Nitrogen and Food. The Task Force invites the Working Group on Strategies and Review to offer comments and ask questions that might yet be addressed in finalizing the document. Key Points:

(a) A sustainable food system is essential for achieving nutrition security and healthy diets for all, while reducing ecological imbalances and contributing to socio-economic welfare.

(b) Solutions to balance nitrogen flows throughout the food system and reducing nitrogen air pollution, as well as other forms of wasted nitrogen, will make the food system more resilient and efficient, and help to provide healthy diets for all.

(c) Many effective technologies to reduce nitrogen pollution at farm and food chain level already exist.

(d) There are examples of functioning existing and envisioned food systems that can guide a future policy vision of sustainable food systems.

(e) Only a combination of technological measures and diet shifts will allow ambitious nitrogen emission reduction targets to be reached at acceptable societal costs.

(f) Integration of health and environmental policies needs to be strengthened to change consumption patterns for a sustainable and healthy diet.

(g) To ensure food system transformation, it is essential to consider the needs of all segments of society, including the poor and vulnerable, and to consider all dimensions of sustainability.

(h) A holistic and integrated food system, needs more innovative governance frameworks.

A. Nitrogen and the nutrition transition: recognizing the current crisis

2. The draft special report of the European Nitrogen Assessment (ENA) currently being finalized identifies an urgent need to accelerate the transition to more sustainable nitrogen management and more sustainable food systems. For both Europe and the world as a whole, the case had been made based on strong scientific evidence that has been accumulated in the last decade. For both scales there are also signs that the voice has been heard, as illustrated by the Colombo Declaration on Sustainable Nitrogen Management[1], the European Union Farm to Fork Strategy[2] and the advance document for the upcoming United Nations Food Systems Summit[3].

[1] UNEP (2019) Colombo Declaration on Sustainable Nitrogen management. UNEP/EA.4/L16. Edited by United Nations Environment Assembly of the United Nations Environment Programme. Nairobi, Kenya. Available at: https://papersmart.unon.org/resolution/uploads/k1900867.pdf.

[2] https://ec.europa.eu/food/farm2fork_en.

[3] https://www.un.org/en/food-systems-summit.

3. The report builds on the first ENA special report on nitrogen and food,[4][5] demonstrating co-benefits between health and reduced environmental impact. The report confirms that it is possible to make diets in industrialized countries healthier and to reduce nitrogen losses and greenhouse gas emissions at the same time. Production and consumption of livestock products – and in particular (red) meat, play a central role the discussion of options for the reduction of transboundary air and water pollution, with multiple environmental and health benefits.

4. Global nitrogen losses are found to pose a serious threat to environmental sustainability. These losses also compromise the ability of the agriculture sector to feed a growing world population, since wasted nitrogen does not contribute to food production. At the same time, nitrogen losses to air and water highlight the unsustainability of present western dietary patterns and the special challenges associated with a high intake of meat and dairy.

5. Population growth and economic development in high and middle income countries have caused a "nutrition transition" that has increased the demand for meat and foods high in salt, sugar and fats to acute levels, given rise to an increasing trend of life-style-related chronic diseases. Prior to around the 1970s, health concerns in many countries were strongly driven by concerns of insufficient food. Following the 'nutrition transition' health concerns across much of the world are now increasingly being dominated by problems associated with excess food intake, and of excess intake of foods with a high nitrogen footprint. Nitrogen use efficiency across the food system has decreased, so that our ability to produce more food than we need is accompanied by simultaneous environmental and health crises.

6. At the same time, poverty in many low-income countries, especially those in sub-Saharan Africa and South Asia, means that many citizens still lack sufficient food. Such countries urgently need access to sufficient nitrogen inputs to improve agricultural productivity, as a basis to ensure adequate nutrition and quantities of food for all.

7. The ENA special report strengthens the scientific evidence that links nitrogen and food systems. The report highlights the need for more ambitious actions to transform the current food system into a sustainable food system which preserves a clean planet, where critical levels of transboundary air pollution, water pollution, climate change and stratospheric ozone depletion become things of the past. At the heart of such a change is the requirement for sustainable nitrogen management and healthy diets, which lead to multiple benefits across the full suite of the Sustainable Development Goals. To be effective and sustainable in the longer term, nitrogen management needs to incorporate a food system approach, with appropriate governance action across policy sectors and targeting a wider set of food system actors. Such a food systems approach is needed as part of a package that addresses all nitrogen sources and sectors, including energy, transport and wastewater sectors. While the present report focuses on the food system, it is evident that the necessary actions have interactions across all sectors.

B. Understanding and addressing the barriers

8. While nitrogen losses predominantly occur at the farm level, farmers alone are often not in the position to change their practices towards sustainable nitrogen management. More powerful players such as large globalised companies throughout food value chains need to recognise their responsibility. Such bodies have the opportunity to drive action in keeping the global nitrogen cycle within its regional, continental and planetary boundaries. At the same time, management of the global food system represents a negotiation between governments and international food system actors. There are therefore major opportunities

[4] Westhoek, H. et al. (2015) Nitrogen on the Table: The influence of food choices on nitrogen emissions and the European environment. (European Nitrogen Assessment Special Report on Nitrogen and Food.). Edinburgh, UK: Centre for Ecology & Hydrology. Available at: http://www.clrtap-tfrn.org/sites/clrtap-tfrn.org/files/documents/EPNF Documents/Nitrogen_on_the_Table_Report_WEB.pdf.

[5] Westhoek, H. et al. (2014) 'Food choices, health and environment: Effects of cutting Europe's meat and dairy intake', Global Environmental Change 26, 196–205.

for governments to reduce transboundary nitrogen air and water pollution, with simultaneous benefit to reduce climate change and other threats, by working with global food system actors.

9. While being complex on its own, food systems are interconnected with other societal systems. Food systems contribute to the health system, to the economic system and to the social tissue of society. Recognizing this interconnectivity, the report finds that changes to the food system might be incentivised by policy areas outside the environment/food security domain, with potentially significant benefits for the environment. It is therefore paramount to identify those synergies and develop coordinated pathways.

10. Such connectivity, points to the need for policy-makers to make the links between challenges related to nitrogen and sustainable food systems as a foundation for effective transformation.

C. Linking technological and societal opportunities for change

11. Even using currently available technologies, there is considerable scope for improving farm-level nitrogen use efficiency (NUE_{farm}). This is particularly true for arable systems, which could exceed 90 per cent NUE_{farm}. Even for grain-fed livestock, it an estimated 80 per cent NUE_{farm} is estimated to be achievable, with 55-60 per cent achievable for ruminant-based meat production. Future technologies including in precision and digital farming have the potential to improve NUE_{farm} beyond currently achievable levels, and should be combined with integrated landscape and regional level approaches for a better nitrogen cycling.

12. Future foods, such as farmed insects, farmed seafood, microorganisms such as microalgae and fungi, as well as the so called ‘cultured meat’, have been shown to have the potential to supply valuable nutrients to human diets in a land-efficient way and with lower greenhouse gas emissions than current practices. Such foods are expected also to be feasible with lower nitrogen emissions, as compared with conventional animal-based foods.

13. New models of food production such as a “visionary food system” and agro-ecological approaches, as well as the revival of traditional successful food system “archetypes” can serve as blueprints for sustainable food systems. The key requirements are that “mixed” farming systems are required, linking animal and crop production and management of on farm nitrogen and other nutrient resources, where approaches are adapted to local contexts in terms of priority challenges, environmental potentials, and socio-economic setting. Sustainable food systems can vary significantly in concept, scales and technologies, but the key ingredients include a focus on nutrition sensitive food supply, circularity of nutrient flows, and avoiding/reducing competition for land.

14. While recognizing that there are opportunities for more sustainable crop and livestock systems, changing the way food is supplied will not be sufficient to reach environmental goals to avoid adverse effects. In this case ambitious targets for nitrogen emission reductions are required, which would necessitate a combination of action between technical solutions and societal measures. While ambitious implementation of current technological solutions can achieve deep cuts in nitrogen emissions, this comes at high societal costs. Diet shifts towards high shares of plant-based proteins in combination with technological measures help to lower costs and barriers for reaching nitrogen pollution reduction targets. Ambitious action therefore requires a combination of both improved nitrogen management in the food chain and changed consumption patterns, especially when considering the United Nations Economic Commission for Europe (ECE) context where, food and protein intake greatly exceeds dietary needs. At the same time, reducing energy and protein intake, and replacing meat and dairy with plant-based protein sources for many citizens across the ECE region will generate benefits for public health through reduction of obesity and non-communicable diseases.

D. Dietary sustainability guidelines and food system policies

15. The benefit of diets with low shares of animal-source foods are well established. However, national recommendation on diets generally give little attention to the needs of those choosing diets low in animal-based food. Similarly, dietary guidelines mostly neglect environmental outcomes related to dietary choices, including air pollution, nitrogen emissions, soil degradation and biodiversity loss. Future "sustainability-minded food based dietary guidelines" offer the opportunity to give them more attention to environmental concerns. Aiming for sustainable food systems can also prompt actions towards a shared dietary target by all food-system actors, from producers and retailers to food services and consumers.

16. A key consensus identified in the draft report is that such a shift to sustainable food systems will require new mind-sets, responsible actions from all food-system actors, revision of regulatory frameworks and policy support. The report highlights gaps in current policy mixes, where there is a void of policies focused on dietary consumption. This applies to both healthy and sustainable diets. A wide range of policy instruments need to be considered including administrative, information, market and behavioural policies. It is noted that current policy initiatives focus on information campaigns, while stronger policies such as taxes and subsidies have been less used. A combination of demand-side instruments, for example, by implementing informative policies, together with market-based policies, offers potential for increased effectiveness.

E. The way forward

17. While the focus of the draft report lies on avoiding nitrogen losses and promoting healthy diets, it also makes clear that sustainability is based on three pillars: social including nutrition, economy and environment. A future transition towards sustainable food systems must recognise the challenges and trade-offs in all sustainability dimensions. The future transition needs to recognize the principle to "do no harm" as a foundation to support a transition for those affected by necessary changes in consumption patterns.

18. Food interests everybody and if not everybody is heard, the necessary transition will fail. Therefore, the "compass" of food system sustainability needs to show direction related to four cardinal points for sustainability:

(a) Healthy, adequate and safe diets,

(b) Clean and healthy planet,

(c) Economically thriving food systems supportive of the common good, and

(d) Just, ethical and equitable food systems.

19. Within each axis, goals and matching indicators need to be agreed for a number of areas of concern. Each of these indicators must be selected according to the specific context. Indicators need to be accompanied with quantified targets, determined in an open and transparent policy process, as the basis for assessing trade-offs, monitor progress, and provide accountable information.

20. The report also highlights that for achieving a sustainable food system, we need to go beyond a view of the food system as linear and "single focused", to comprehend the food system as a complex web with multiple feed-back loops. Meeting the challenges requires actions across the food system, and policy-makers need to enable a governance structure and framework so that all those who help to produce, process, distribute, prepare, or consume food – or manage residues – can work together.