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**Steering Body to the Cooperative Programme for
Monitoring and Evaluation of the Long-range
Transmission of Air Pollutants in Europe**

Working Group on Effects

Seventh joint session

Geneva, 13–16 September 2021

Report of the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe and the Working Group on Effects on their seventh joint session



I. Introduction

1. The Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) and the Working Group on Effects under the United Nations Economic Commission for Europe (ECE) Convention on Long-range Transboundary Air Pollution (Convention) held their seventh joint session online from 13 to 16 September 2021 in Geneva.

A. Attendance

2. The session was attended by representatives of the following Parties to the Convention: Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, European Union, Finland, France, Georgia, Germany, Hungary, Iceland, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America.

3. Also participating were representatives of the following EMEP centres: the Chemical Coordinating Centre (CCC); the Centre for Integrated Assessment Modelling (CIAM); the Centre on Emission Inventories and Projections (CEIP); the Meteorological Synthesizing Centre-East (MSC-E); and the Meteorological Synthesizing Centre-West (MSC-W). Representatives of the following scientific centres and bodies under the Working Group on Effects participated: the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends (ICP Modelling and Mapping) and its Coordination Centre for Effects (CCE); the Centre for Dynamic Modelling (CDM); the Joint Task Force on the Health Aspects of Air Pollution (Task Force on Health); the Programme Centre of the International Cooperative Programme on Assessment and Monitoring of the Effects of Air Pollution on Rivers and Lakes (ICP Waters); the Programme Centre of the International Cooperative Programme on Effects of Air Pollution on Materials, including Historic and Cultural Monuments (ICP Materials); the Programme Centre of the International Cooperative Programme on Effects of Air Pollution on Natural Vegetation and Crops (ICP Vegetation); the Programme Centre of the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (ICP Integrated Monitoring); and the Programme Coordinating Centre of the International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests). Also in attendance were the Chair of the Executive Body, the Vice-Chairs of the Working Group on Strategies and Review and representatives of the Task Force on Reactive Nitrogen (TFRN) and the Task Force on Techno-economic Issues (TFTEI).

4. Also present were representatives of the Air Pollution and Climate Secretariat, Aarhus University (Denmark), Eurasian GHG Management LLP, the European Chemical Industry Council, the European Commission Joint Research Centre, the European Environment Agency, the European Environmental Bureau, the Faculty of Sciences of the University of Lisbon, the European Youth Engagement Laboratory (Génération Maastricht), the World Health Organization (WHO), the World Meteorological Organization and Zhytomyr Polytechnic State University (Ukraine).

B. Organizational matters

5. Ms. Laurence Rouïl (France), Chair of the EMEP Steering Body, and Ms. Isaura Rábago (Spain), Chair of the Working Group on Effects, co-chaired the session. Ms.

Francesca Bernardini (Chief, Transboundary Cooperation Section, ECE Environment Division) provided opening remarks. At the invitation of the Co-Chairs, participants adopted the agenda for the session (ECE/EB.AIR/GE.1/2021/1–ECE/EB.AIR/WG.1/2021/1).¹

6. Due to the coronavirus disease (COVID-19) pandemic-related travel restrictions and sanitary limitations imposed in Switzerland and in other countries, it was decided that the seventh joint session would be held remotely. Moreover, the meeting format had to be shortened and modified. The length of the meeting was reduced to three and a half working days and the duration to 21 hours. Five 3-hour-long sessions were held with simultaneous interpretation and two 3-hour-long session were held in English only. The parts of the sessions held with interpretation included the following key agenda items: joint thematic session on review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (item 7); draft 2022–2023 workplan (science part; item 3); financial and budgetary matters (item 4); conclusions and recommendations (item 8); information-sharing by Parties (item 9); and closing of the session (item 12). For more details, see the informal document entitled “Organization of work during the seventh joint session” under agenda item 1.

7. The Steering Body and the Working Group on Effects subsequently adopted the report on their sixth joint session (ECE/EB.AIR/GE.1/2020/2–ECE/EB.AIR/WG.1/2020/2).

II. Financial and budgetary matters

8. The secretariat introduced the note on financial and budgetary matters (ECE/EB.AIR/GE.1/2021/19–ECE/EB.AIR/WG.1/2021/12). The Steering Body and the Working Group:

(a) Took note of the information on financial and budgetary matters provided by the secretariat;

(b) Approved the proposed conclusions and recommendations as outlined in paragraphs 10 and 21 of the note.

9. Mr. Martin Forsius (Head, Programme Centre, ICP Integrated Monitoring, Finnish Environment Institute) reported that, as of 1 January 2022, the Programme Centre would be moved from Finland to Sweden. Mr. Ulf Grandin (Co-Chair of ICP Integrated Monitoring, Swedish University of Agricultural Sciences) reported that Sweden had offered to take over the Programme Centre and that the transition process had started in early 2021 and would be completed formally by the end of the year.

10. The Steering Body and the Working Group:

(a) Expressed their gratitude to Finland for hosting the Programme Centre of ICP Integrated Monitoring at the Finnish Environment Institute for the past 33 years;

(b) Welcomed the offer of Sweden to host the Programme Centre as of 2022;

(c) Recommended that the Executive Body amend decision 2002/1 on the financing of core activities to reflect the fact that the Programme Centre of ICP Integrated Monitoring was being transferred from the Finnish Environment Institute to the Swedish University of Agricultural Sciences.

¹ Information and documentation for the meeting, including informal documents and presentations, is available at <https://unece.org/info/Environmental-Policy/Air-Pollution/events/350954>.

A. Funding of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

11. The secretariat introduced the elements of section I of the above-mentioned note relevant for EMEP. The proposed schedule of mandatory contributions for 2022–2023² had been calculated on the basis of the 2018 United Nations scale of assessments.³ The secretariat also reported on the status of the contracts between ECE and the EMEP centres.

12. The Steering Body and the Working Group:

(a) Agreed on the proposal for the EMEP budget for 2022 prepared by the Steering Body Bureau and decided to forward it for approval by the Executive Body at its forty-first session (Geneva (hybrid), 6–8 December 2021). The proposed budget aimed at funding the mandatory and usual activities of the EMEP centres related to the implementation of the Convention. The total EMEP budget for 2022 (\$2,358,700) would be the same as for 2021, with the following split between centres: CIAM – \$169,000; CCC – \$824,000; MSC-W – \$574,000; MSC-E – \$459,000; and CEIP – \$264,000;⁴

(b) Invited the Bureau of the Steering Body to discuss the 2023 budget for the EMEP centres at its next meeting in 2022.

B. Funding of effects-related activities

13. The secretariat introduced the elements of section II of the above-mentioned note. The secretariat reported on the proposed budget for funding of effects-oriented activities in 2022 (\$2,358,700) and of the provisional budgets for 2022 and 2023 for the same amount. The details of the budget (international coordination costs) were presented in document ECE/EB.AIR/GE.1/2021/19–ECE/EB.AIR/WG.1/2021/12, table 10. The secretariat also presented information on the status of the contracts for 2021.

14. The Steering Body and the Working Group:

(a) Noted the proposal on the international coordination costs for core activities in 2022 not funded through the EMEP Protocol and the provisional budgets for 2023 and 2024 (see ECE/EB.AIR/GE.1/2021/19–ECE/EB.AIR/WG.1/2021/12, table 10);

(b) Noted with appreciation the amount of voluntary cash contributions made available in 2020–2021, but again invited all Parties that had not yet done so to contribute to the trust fund for financing of the effects-oriented activities, without undue delay.

III. Matters arising from recent meetings of the Executive Body and its subsidiary bodies and activities of the Bureaux of the Steering Body and the Working Group on Effects.

15. Presenting highlights of the fifty-ninth session of the Working Group on Strategies and Review (Geneva (hybrid), 18–21 May 2021), a Vice-Chair of the Group, Ms. Dominique Pritula (Canada):

² ECE/EB.AIR/GE.1/2021/19–ECE/EB.AIR/WG.1/2021/12, table 4.

³ See General Assembly resolution 73/271 on the scale of assessments for the apportionment of the expenses of the United Nations (A/RES/73/271).

⁴ ECE/EB.AIR/GE.1/2021/19–ECE/EB.AIR/WG.1/2021/12, table 3.

(a) Noted that, due to the COVID-19 pandemic, the session had been postponed from May to December 2020 and had taken place during the same week as the fortieth session of the Executive Body (Geneva (hybrid), 18 December 2020);

(b) Also noted that the Working Group had heard updates from TFTEI, TFRN, TFTIAM and TFHTAP on their work and had discussed the final draft of a guidance document on sustainable nitrogen management (https://unece.org/fileadmin/DAM/env/documents/2020/AIR/EB/ECE_EB.AIR_2020_6-2008239E.pdf) developed by TFRN;

(c) Discussed the preparatory document submitted by the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol) Review Group (ECE/EB.AIR/2020/3–ECE/EB.AIR/WG.5/2020/3), which included the scope and content and schedule of work (including annex I with the questions for subsidiary bodies), and agreed that the scope should be kept broad and that the focus, at the current time, should be on gathering scientific and technical inputs into the review;

(d) Heard information on considerations related to ammonia and black carbon (BC) that were relevant for the review, and decided that further evaluations would be subsumed as part of the overall review process;

(e) Welcomed an informal document on non-technical and structural measures and information on barriers to implementation and ratification of the Convention's protocols and invited delegations to submit comments for the next Working Group on Strategies and Review meeting. On barriers to ratification, the Working Group agreed that an in-depth discussion would be needed to properly assess the options; thus it was agreed to hold a thematic session dedicated to that topic, which it was thought would be best held in person;

(f) Heard information provided by the EMEP Steering Body Chair about progress of work carried out by the EMEP centres and task forces on the treatment of condensables in emission inventories and modelling. The EMEP Steering Body would establish an ad hoc group of experts to develop a stepwise and science-based approach for accounting for the condensable part in particulate matter (PM). It was emphasized that both the policy and science aspects of the issue were important considerations in the context of the review discussion.

16. Presenting highlights of the fortieth session of the Executive Body for the Convention, the Executive Body Chair noted that the Executive Body had:

(a) Taken note of the report of the sixth joint session of the EMEP Steering Body and the Working Group on Effects (ECE/EB.AIR/GE.1/2020/2–ECE/EB.AIR/WG.1/2020/2);

(b) Taken note of the report of the Chair of the Working Group on Strategies and Review; adopted the Guidance document on integrated sustainable nitrogen management (ECE/EB.AIR/2020/6–ECE/EB.AIR/WG.5/2020/5);

(c) Taken note of the twenty-third report of the Implementation Committee (ECE/EB.AIR/2020/2) and held the elections of its members and the Chair;

(d) Taken note of the information on capacity-building activities and thanked Parties supporting those activities;

(e) Taken note of the information on communication and outreach activities prepared by the secretariat and expressed regret that little progress had been reported on the forum for international cooperation on air pollution;

(f) Adopted the plan for undertaking the review of the Gothenburg Protocol, as amended in 2012;

(g) Taken note of the financial requirements for the implementation of the Convention (ECE/EB.AIR/2020/1) and made respective decisions;⁵

(h) Noted a relatively good attendance but noted few representatives from countries in Eastern Europe, the Caucasus and Central Asia;

(i) Deferred to the next session the elections of the Chair and three Vice-Chairs of the Executive Body and the Chair of the Working Group on Strategies and Review.⁶

17. Ms. Alison Davies (United Kingdom of Great Britain and Northern Ireland) reported on the initiative of Sweden and the United Kingdom of Great Britain and Northern Ireland to lead the work of the forum for international cooperation on air pollution (Executive Body decision 2019/5).⁷ At its fifty-ninth session, the Working Group on Strategies and Review had recommended to the Executive Body that the forum be established as a task force reporting to the Working Group and had invited the lead countries to develop a draft mandate for the task force and to submit it for consideration by the Executive Body at its forty-first session.⁸ Ms. Davies recalled the purposes of the forum and outlined possible activities of the forum: information-sharing on policy and on science; technical capacity-building and information-sharing on funding opportunities.⁹ The forum would help in reaching out to more globally focused organizations, non-governmental organizations and stakeholders to explore possible synergies in activities and facilitate sharing of information and expertise developed by the Convention. She asked participants:

(a) What the best way would be to reach out to non-ECE countries and organizations;

(b) Whether capacity-building activities were currently being carried out by task forces that could be promoted through the forum;

(c) What science/technical topics it would be most important to include in the first meeting of the forum; and

(d) In the light of the interest displayed by Sweden and the United Kingdom of Great Britain and Northern Ireland in developing a scientific and technical toolkit for the website (a page of links to advice and guidance), whether there were any views on what that should include to make it accessible to the broadest range of countries and organizations.

18. The Chair of the EMEP Steering Body presented a brief summary of the work of the Bureaux of the EMEP Steering Body and of the Working Group on Effects (see ECE/EB.AIR/GE.1/2021/9–ECE/EB.AIR/WG.1/2021/20), highlighting the implementation of the 2020–2021 workplan, discussions on the contribution of the two scientific bodies to the review of the Gothenburg Protocol, key scientific issues (e.g., condensables, long-term ecosystem monitoring) and the work on the updated strategy for EMEP and the Working Group on Effects.

⁵ ECE/EB.AIR/146, paras. 9, 11 (a)–(b), 12, 14, 15 (b)–(c), 17, 18, 19 (a) and 20.

⁶ *ibid.*, para. 26.

⁷ All Executive Body decisions referred to in the present document are available at <https://unece.org/decisions>.

⁸ ECE/EB.AIR/WG.5/126, para. 38.

⁹ See informal document No. 4 for the thirty-ninth session of the Executive Body entitled “Forum for international cooperation on air pollution: Proposal”. Available at <https://unece.org/info/Environmental-Policy/Air-Pollution/events/18910>.

IV. Progress in activities in 2021 and further development of effects-oriented activities

A. Air pollution effects on health

19. The Chair of the ECE/WHO Task Force on Health provided highlights of the twenty-fourth meeting of the Task Force (online, 10 and 11 May 2021), which had focused on the progress in implementation of the 2020–2021 workplan, including on consolidating evidence on health effects of air pollution, tools and capacity-building, as well as on the Task Force workplan for 2022–2023. The major forthcoming event (on 22 September 2021) was the launch of WHO global air quality guidelines, which included revised (mainly downwards) air quality guideline levels and interim targets for PM_{2.5}, PM₁₀, nitrogen dioxide, ozone, sulfur dioxide and carbon monoxide, as well as good practice statements for some types of PM. Implementation of those ambitious goals for air quality to protect public health would require intersectoral efforts at different scales. In addition, by the end of 2021, publication of a report on human health effects of polycyclic aromatic hydrocarbons (PAHs) as ambient air pollutants was planned. Work continued on tools to quantify the health impacts of air pollution, as well as on tools linking it with climate change mitigation efforts. Capacity-building activities had been downscaled due to the pandemic. The 2022–2023 workplan would largely build on the current workplan. On consolidating evidence on health outcomes of exposure to air pollution, the emphasis would be on updating methods for health risk/impact assessment of air pollution and cost benefit analysis (last revised in the Health risks of air pollution in Europe project in 2013), as well as promoting uptake of new air quality guidelines; the work on the tools would continue, including on the links with climate action, as well as on capacity-building and communication of health messages related to air pollution. Thematic input would be provided to the review of the Gothenburg Protocol as needed.

20. The Steering Body and the Working Group noted the importance of the WHO global air quality guidelines update to be launched on 22 September 2021.

B. Critical loads and other issues related to modelling and mapping

21. The Chairs of the ICP Modelling and Mapping Task Force, CCE and CDM reported jointly on progress in activities in 2021, including the outcomes of the thirty-seventh Task Force meeting (online, 20–22 April 2021). The meeting had focused on addressing the main scientific challenges regarding critical loads and levels and air pollution effects, risks and trends. The work achieved in that regard and since that meeting had focused on:

- (a) Sharing knowledge on critical loads and modelling methodologies addressing the risk of impacts on terrestrial and aquatic ecosystems with National Focal Centres;
- (b) Updating critical loads data used at CCE, in particular:
 - (i) Updating the European background database of nitrogen (N) and sulfur (S) critical loads;
 - (ii) Updating critical loads according to National Focal Centres' inputs in response to the Call for Data 2020–2021;
 - (iii) Review and revision of the empirical critical loads based on the contribution of the designated ad hoc experts' panel.

(c) Performing the critical loads exceedances calculations at 5-year intervals from 2000 until 2019, in terms of percentage of ecosystem area with exceedances and average accumulated excess, with a view to contributing to the Gothenburg Protocol review process as required by the Executive Body in its preparatory document (ECE/EB.AIR/2020/3–ECE/EB.AIR/WG.5/2020/3);

(d) Preparing the requirement specifications for the update of the harmonized Convention receptor map used for diverse modelling purposes by different bodies within the Convention framework;

(e) Pursuing the development of metrics for quantifying damage to biodiversity by reviewing the former dynamic modelling work under the Convention and, based thereon, identifying areas of common interest and potential gaps;

(f) Pursuing the development of the common Working Group on Effects portal.¹⁰

22. The Steering Body and the Working Group recommended:

(a) That the review and revision of the empirical critical loads be pursued by CCE during 2022 and be ready for discussion by the Working Group on Effects by September 2022 and for the Executive Body for adoption by December 2022;

(b) That the harmonized Convention receptor map be updated by CCE, starting in 2021 and pursuing in 2022 and 2023;

(c) Reviving the scientific discussion on the critical levels of ammonia through the organization of an expert workshop by CCE in 2022;

(d) Further development on modelling interaction between air pollution and climate change by National Focal Centres and CDM;

(e) Further development of the metrics for quantifying damage to biodiversity due to air pollution by National Focal Centres, CCE and CDM.

C. Air pollution effects on materials, the environment and crops

23. The Head of ICP Materials reported on developments and the outcomes of the thirty-seventh meeting of the ICP Materials Task Force (online, 5–6 May 2021). He also reported on developments and the outcomes of the progress of 2020–2021 activities, including an update on the 2017–2021 exposure for trend analysis, the status of the case studies on United Nations Educational, Scientific and Cultural Organization (UNESCO) cultural World Heritage sites and the revision of the Mapping Manual to include soiling. All deliverables for 2020–2021 workplan items had been finalized and published for open access at the ICP Materials home page.¹¹

24. The exposure for trend analysis 2017–2021 would be finalized in the current year, with a report on corrosion and soiling data in 2022 and reports on environmental data, and the next major report on trends in corrosion, soiling and pollution in 2023. The next revision of chapter 4 of the Mapping Manual was ready and included soiling of non-transparent materials (painted steel, white plastic and polycarbonate membrane), as well as transparent modern glass.

25. Based on the call for data at UNESCO cultural World Heritage sites, it was possible to estimate savings in maintenance/repair costs depending on different pollution scenarios.

¹⁰ See www.unece-wge.org/.

¹¹ See www.ri.se/en/icp-materials.

The estimation would be more accurate using the new models with increased geographical resolution.

26. The Head of the ICP Forests Programme Coordinating Centre summarized the highlights of the thirty-seventh Task Force Meeting of ICP Forests and the Ninth Forest Ecosystem Monitoring Conference (Birmensdorf, Switzerland (hybrid), 7–11 June 2021), presented the key deliverables of the Programme Coordinating Centre, such as ICP Forests Brief No. 4 entitled “Increased evidence of nutrient imbalances in forest trees across Europe”, the 2020 Technical Report entitled *Forest Condition in Europe: The 2020 Assessment*, the twenty-third needle/leaf interlaboratory comparison test, the forthcoming ICP Forests Brief No. 6 on status and trends of heavy metals (HM) in European forests, and the contribution of ICP Forests to the *State of Europe’s Forests 2020* report.¹² Moreover, he highlighted the main activities of ICP Forests over the past 12 months and presented the content of the upcoming 2021 Technical Report entitled *Forest Condition in Europe: The 2021 Assessment*, which contained data from 32 of the 42 member countries of ICP Forests, a list of the 81 publications based on ICP Forests data and/or infrastructure, an overview by the Chairs of the Expert Panels of the most significant literature/findings in their respective fields, the national reports, and the regular chapters on:

- (a) Atmospheric throughfall deposition in European forests in 2019;
- (b) The tree crown condition in 2020; and
- (c) HM in the forest floor and topsoil of ICP Forests Level II plots.

27. The representative of ICP Forests proposed the ICP Forests activities/objectives/deliverables for the 2022–2023 workplan. Lastly, important findings regarding the status and trends of HM in Europe’s forests based on the report entitled *Heavy metals in forest floors and topsoils of ICP Forests Level I plots: Based on the combined Forest Soil Condition Database – Level I (FSCDB.LI)*¹³ were discussed in more detail. It was highlighted that:

- (a) HM specific variation patterns in forest floors and topsoils were found within countries, biogeographical regions and Europe;
- (b) Regional hotspots of elevated HM concentrations were clearly visible on maps and could be linked to local pollution sources and well-known contaminated areas;
- (c) Compared to the mineral topsoil, HM accumulated significantly more in the humus layer;
- (d) Generally, HM concentrations in forest soils had declined from 1990 onwards, although rates of change differed by HM and between countries. Undoubtedly, a methodological country effect could be seen.

28. The Chair of ICP Waters provided an overview of recent progress, including key messages from the thirty-seventh Task Force meeting (online, 28 and 29 April 2021). The Chair presented a status report on recent progress in ICP Waters, in particular on recent activities related to effects of N deposition on freshwater lakes and on trends in nitrate in lakes. An analysis of a Nordic lake data set had shown that algal productivity per unit mass of dissolved total phosphorus increased at low levels of N deposition, suggesting N limitation for those lakes. The analysis would contribute to the ongoing review and revision of empirical critical loads of N and would result in ICP Waters Nitrogen Report No. 3. Trends in lake

¹² Forest Europe (Bratislava, 2020).

¹³ Tine Bommarez, Nathalie Cools and Bruno De Vos (Brussels, Research Institute for Nature and Forest, 2021). Available at http://icp-forests.net/profiles/blogs/new-report-heavy-metals-in-forest-floors-and-topsoils-of-icp-fore?xg_source=activity.

nitrate did not match downward trends in N deposition because of catchment properties and catchment N processing. The results of the trend analysis and the analysis of spatial variation in nitrate would be published in an ICP Waters report. Water quality data were being delivered to the European Union National Emission reduction Commitments Directive,¹⁴ including from some countries that did not deliver data to ICP Waters. It would be a win-win situation for the Convention and the Directive if data from those countries were also included in ICP Waters data assessments. The next report planned from ICP Waters (2022) would be on biological recovery and responses to changing water chemistry.

29. A Co-Chair of ICP Integrated Monitoring reported on the outcomes of the twenty-ninth meeting of the ICP Integrated Monitoring Task Force (online, 13–14 April 2021). He presented the main activities, progress related to the 2020–2021 workplan and activities planned for the 2022–2023 workplan, including:

- (a) Highlights from a doctoral thesis based entirely on ICP Integrated Monitoring data;
- (b) Plans for continued work on critical load exceedances and empirical ecosystem impact indicators, in cooperation with other ICPs and EMEP;
- (c) Continued work on mercury and other HM;
- (d) The fact that the ICP Integrated Monitoring database had been moved from the Finnish Environment Institute to the Swedish University of Agricultural Sciences;
- (e) The proposal that the ICP Integrated Monitoring Programme Centre be moved from the Finnish Environment Institute to the Swedish University of Agricultural Sciences;
- (f) Suggested activities for the 2022–2023 workplan:
 - (i) Operationalize and advertise “Integrated Monitoring (IM) light” as an attractive monitoring protocol, aiming at adding more ecosystem types in the IM monitoring;
 - (ii) Continued work on the trends in ecosystems connected to the review of the Gothenburg Protocol and questions asked from the policy groups (to be determined later);
 - (iii) Prepare scientific paper on modelling and assessment of biodiversity and ecosystem impacts, in cooperation with, for example, CDM.

30. The Chair of the ICP Vegetation Task Force summarized the highlights of the thirty-fourth Task Force Meeting (online, 22–24 February 2021). She reported on progress with 2020–2021 workplan items and on planned activities for 2022–2023. The key messages were that:

- (a) Progress had been made regarding improving ozone risk assessment in soil moisture limited areas – that work would continue;
- (b) Progress had been made with flux-effect models for some tropical crops to improve global risk assessments;
- (c) Assessment of the effect of ozone on living biomass of sensitive trees had shown that ozone decreased carbon sequestration in many parts of Europe; development of a coupled photosynthesis-based flux model was ongoing;

¹⁴ Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC, *Official Journal of the European Union*, L 344 (2016), pp. 1–31.

(d) An HM in mosses report from the 2015/16 survey had been published; the 2020/21 survey was underway (extended to 2022); approximately 1,500 samples had been collected to date; the survey would include a pilot study on microplastics content of mosses;

(e) ICP Vegetation had continued to prepare for the upcoming review of the Gothenburg Protocol by reviewing and reintroducing parameterizations to allow large-scale modelling of impacts of ozone on crops and semi-natural vegetation;

(f) Outreach activities continued to raise awareness and to share skills and expertise.

D. Common website of the Working Group on Effects

31. The Chair of the Working Group and the Head of CDM reported on the status of development of the common Working Group website.¹⁵ The website had been developed by CDM, supported by ICP Forests and a Vice-Chair of the Working Group. The main purpose of the website was to increase the visibility of effects-related work and to provide access points to ICP data and reports/publications by providing links to individual ICPs. The website was aimed at Convention actors unfamiliar with effects, as well as at policymakers, scientists and students. The proposed update to the website would change its layout and structure to a theme-based one (monitoring, modelling and mapping). The draft updated website would be presented at the next Extended Bureaux meeting (21–24 March 2022).

32. The Steering Body and the Working Group:

(a) Noted that the reports relevant for the evaluation of progress in implementing the 2020–2021 workplan had been prepared by the centres under the Working Group on Effects on time and were all available on their respective websites;

(b) Welcomed and approved the work carried by the centres under the Working Group on Effects in 2021 as presented at the current session and in their 2020–2021 reports and other publications available on the websites of the respective ICPs, the Task Force on Health and CIAM and briefly described in the official documents for the seventh joint session and in the 2021 joint report (ECE/EB.AIR/GE.1/2021/3–ECE/EB.AIR/WG.1/2021/3);

(c) Recommended further work on a common Working Group on Effects website to better promote the effects-oriented work and to improve access to relevant information, data and publications.

V. Progress in activities under the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe in 2021 and future work

A. Emissions

33. The Co-Chair of the Task Force on Emission Inventories and Projections (TFEIP) reported on the results of the 2021 joint meeting of the Task Force and the European Environment Agency (EEA) European Environmental Information and Observation Network (online, 4–6 May 2021). The Co-Chair presented recent progress made by the Task Force, highlighting decisions related to technical revisions to emissions inventory guidance:

¹⁵ See www.unece-wge.org/.

(a) *Agriculture*: Nitrogen oxide emissions from crop residues were to be included, Parties should make efforts to account the impacts of the import/export of manure where it was significant, and discussions had been held regarding the precise definition of “agricultural” sources. Additional guidance would be drafted and published on those topics;

(b) *Transport*: Updated chapters for the *EMEP/EEA air pollutant emission inventory guidebook* (EMEP/EEA Guidebook)¹⁶ had been published for Road Transport and Navigation (shipping);

(c) *Combustion and industry*: An updated EMEP/EEA Guidebook chapter for Food and Beverages had been published;

(d) Ad hoc groups were on standby to draft additional guidance documents, to be posted on the EMEP/EEA Guidebook website, for agriculture, solvent use and inventory management. Publication dates were to be confirmed, but were likely to be in November 2021, to allow Parties enough time to review and use them for submissions in 2022.

34. The EMEP/EEA Guidebook was scheduled for a full review and update in 2023. It was expected that the focus would be on the addition of regionally specific emission factors for Tier 1 methodologies, and the incorporation of temperature dependence in emission calculation methodologies where appropriate. A proposal had been received to form a new Expert Panel on Waste, which had been welcomed by TFEIP and was expected to be approved at the 2022 TFEIP annual meeting. The Co-Chair noted that TFEIP had contributed to the review of the Gothenburg Protocol, and would continue to support the process throughout the coming months to the extent possible. The TFEIP Black Carbon working group had been liaising with the United Nations Framework Convention on Climate Change (UNFCCC) group on short-lived climate pollutants.

35. The Co-Chair explained that there was a need for additional guidance and templates for adjustments to allow for the application for, and review of, adjustments relating to emission reduction commitments. However, work in that regard could only be undertaken in response to a request from the Executive Body. It should be noted that there would be little time after the forty-first session of the Executive Body to prepare the additional documentation. Parties needed to indicate whether they would be submitting an adjustments application by 15 February, and new guidance was estimated to require 6–8 weeks to prepare. He requested the Steering Body to instruct TFEIP and CEIP to make the necessary preparations ahead of the forty-first session. Several Parties supported the request.

36. The Steering Body and the Working Group:

(a) Concluded that BC remained an important pollutant within the context of the Convention and welcomed continued collaboration with UNFCCC and the Arctic Council on that topic;

(b) Requested TFEIP and CEIP to prepare information, including preliminary technical advice and draft updated templates, ahead of the forty-first session of the Executive Body; the aim was to support the Executive Body in determining a practical way of quickly preparing and approving updated guidance and templates for inventory adjustment, if found to be needed, and to raise awareness about the main changes compared to previous years, ensuring a smooth transition from the emission ceilings regime to the post-2020 emission reduction commitments;

¹⁶ Available at www.eea.europa.eu/themes/air/air-pollution-sources-1/emep-eea-air-pollutant-emission-inventory-guidebook.

(c) Requested that Parties contact TFEIP Co-Chairs to indicate the worked examples that they would like to see included in the guidance material.

37. The Head of CEIP provided information on the status of reporting of emissions data regarding their completeness and consistency. As at 1 September 2021, 48 out of 51 Parties had submitted data. No emission data had been received from Azerbaijan, Bosnia and Herzegovina and Kyrgyzstan. Forty-two Parties had reported BC emissions, with thirty-eight Parties submitting emission time series (2000–2019). An overview of all data submitted by Parties during the 2021 reporting round could be accessed via an interactive data viewer. CEIP had noted partly improved reporting from some countries in Eastern Europe, the Caucasus and Central Asia. However, it was vital to further improve the quality of reported data. Forty-six Parties had submitted an Informative Inventory Report (IIR). Several Parties had not provided the Declaration on the publication of the IIR.

38. In 2021, CEIP had assessed reporting of information on condensables. Twenty-three Parties had provided information on inclusion of the condensable component in particle matter (PM₁₀ and PM_{2.5}) emission. The condensable component had not been consistently included in or excluded from reported emissions. The assessment of reporting would continue in 2022.

39. Reporting of gridded data and large point source data was a four-yearly reporting obligation that was due in 2021. Thirty-four countries in total had reported sectoral gridded emissions in 0.1° x 0.1° longitude/latitude grid by 1 September 2021. Gridded data reported after the deadline of 1 May (plus an additional week) would be included in the data set for the modellers only in 2022. Large point source data had been reported by 36 Parties by 1 September 2021.

40. The Head of CEIP reported that, in 2021, gap-filled and gridded data sets had been calculated for 2000 to 2019 for main pollutants and PM and BC and for the year 2019 for HM and persistent organic pollutants (POPs). The gap-filling process and the use of reported data were documented in the report entitled “Methodologies applied to the CEIP GNFR gap-filling 2021”.

41. The Head of CEIP reported on the revision of annex II to the reporting Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary air Pollution (Reporting Guidelines) (ECE/EB.AIR.125) (recommended structure of the IIR) and requested the Steering Body to approve the revised annex so that it could be used from 2022 onwards.

42. The Head of CEIP also reported on the revision of the Reporting Guidelines. Several issues that needed to be addressed have been flagged by the CEIP and TFEIP Chairs. The work on the revision of the Reporting Guidelines would continue in 2022.

43. The Steering Body and the Working Group:

(a) Reminded Parties to provide “Annex III - Declaration on the publication of the IIR” along with their IIR, to ensure that CEIP could publish all IIRs on its web page;

(b) Invited those Parties that had not already done so to provide, in the next submission, the following: (i) gridded and large point source data; (ii) uncertainty estimates; and (iii) BC inventories;

(c) Invited countries in Eastern Europe, the Caucasus and Central Asia and the Western Balkans to continue with the improvement and regular reporting of their emission data and to nominate more experts for the roster of review experts;

(d) Approved the plan to perform (in 2022) an in-depth review of PM emissions from residential heating and road transport, with a special focus on the topic of

“condensables” and a follow-up review of the implementation of recommendations given as part of the review carried out in 2021;

(e) Noted with appreciation that Parties had cooperated sufficiently during the 2021 in-depth review;

(f) Noted with appreciation the plans of the European Commission to sponsor travel to/accommodation at the review meeting for a few Western Balkan experts, via one of its neighbourhood programmes;

(g) Approved the revision of annex II to the reporting guidelines (ECE/EB.AIR.125; recommended structure of the IIR) and recommended that the revised annex II be used from 2022 onwards;

(h) Approved the plans of CEIP and TFEIP to continue the work on the revision of the Reporting Guidelines.

B. Adjustments under the Gothenburg Protocol

44. The Head of CEIP presented the outcome of the review of Parties’ requests for adjustments under the Gothenburg Protocol to inventories for the purposes of comparing total national emissions with them.¹⁷ In 2021, Czechia and France had submitted new applications, and 10 Parties (Belgium, Czechia, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Spain and the United Kingdom of Great Britain and Northern Ireland) had submitted requests for adjustments approved prior to 2021 (more than 35 cases). Hungary had not submitted adjustments in 2021.

45. The adjustment review had been performed alongside the stage 3 review. Each reviewed sector had been analysed by two independent reviewers, while the two lead reviewers had coordinated the work, ensuring that a consistent approach had been used for all sectors, Parties and years.

46. Parties submitting adjustments approved prior to 2021 had voluntarily prepared and submitted the “Declaration on consistent reporting of approved adjustments”, along with annex VII. It was recommended that Parties continue to submit such statements on an annual basis, along with the submitted data, and review teams proposed that such a document become a mandatory part when submitting approved adjustments.

47. The Head of CEIP emphasized that, in 2021, most Parties that had submitted adjustment applications had supported the review process in kind by providing an expert. Such technical support was appreciated and was a prerequisite for carrying out the adjustment review.

48. Based on the analysis of data reported for the year 2019 and projection data, a substantial number of Parties that had accepted the amended Gothenburg Protocol could be in non-compliance with their emission reduction commitments for 2020 for one or several pollutants. Based on previous experience, a substantial number of adjustment applications could thus be expected for the next years. There were four Parties that had accepted the original Gothenburg Protocol but had not (yet) accepted the amended Gothenburg Protocol. Thus, adjustment applications under the 2010 emission ceilings could also potentially be received. The expert review team noted that there was a need to provide additional guidance for reporting and also for review of adjustment applications from 2022 onwards.

¹⁷ See ECE/EB.AIR/GE.1/2021/10–ECE/EB.AIR/WG.1/2021/21.

49. As set out in document ECE/EB.AIR/GE.1/2021/10–ECE/EB.AIR/WG.1/2021/21, the expert review team recommended that:

- (a) The 2021 new adjustment application submitted by France (Agriculture/Non-methane volatile organic compounds, nitrogen oxides) be accepted;
- (b) The withdrawal of the new adjustment application addressed by Czechia (Agriculture/Ammonia/2015) to ECE by 5 August 2021 be accepted;
- (c) The adjustment applications of Belgium, Czechia, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Spain and the United Kingdom of Great Britain and Northern Ireland approved prior to 2021 and resubmitted in 2021 be accepted;
- (d) The “Declaration on consistent reporting of approved adjustments” become a mandatory part of reporting.

50. The Steering Body and the Working Group:

- (a) Approved all the expert review team’s recommendations (see preceding paragraph);
- (b) Requested Parties to follow the CEIP recommendations when preparing and submitting applications for adjustments;
- (c) Recalled Executive Body decision 2019/2 on review of compliance by Parties to the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol).

C. Measurements and modelling

51. A Co-Chair of the Task Force on Measurement and Modelling (TFMM) reported the progress in implementing the 2020–2021 workplan, including highlights of the twenty-second annual meeting (online, 10–12 May 2021). One issue focused on was the inclusion of condensable emissions to improve modelling performances. That work relied on a strong contribution of Task Force representatives through both a field campaign organized in collaboration with the Aerosols, Clouds and Trace gases Research InfraStructure Network and the Chemical On-Line cOmpoSiTion and Source Apportionment of fine aerosoL Cost Action, as well as a multi-model exercise (Eurodelta-Carb) in collaboration with the Copernicus Atmosphere Monitoring Service. Recent results on observed ozone trends in the period 2000–2019 gave the opportunity to highlight the lack of notable improvement in recent years even for ozone peaks, which had previously been reported to decrease over the period 1990–2012. Those findings had motivated the design of an intensive measurement campaign to be implemented in 2022 and which was expected to provide better insight into volatile organic compound monitoring, in particular to improve emission inventories. Several contributions at the TFMM meeting had highlighted the impact of 2020 pandemic lockdowns related to air pollution. That provided the opportunity to put into perspective the sudden change in long-term mitigation and to reflect on the added value of EMEP modelling and monitoring tools to assess such changes, which would become a topic for further work in the future workplan. Besides those specific focuses, and similarly to other EMEP task forces and centres, the central parts of current activities were devoted to the review of the Gothenburg Protocol, which included past trend analyses and future projections. Other topics highlighted for the upcoming biannual workplan included: a new Eurodelta multi-model exercise on benzo[a]pyrene (B(a)P) modelling; country-scale mercury assessment in Norway; and the organization of a workshop on monitoring of chemicals of emerging concern.

52. A representative of MSC-E briefly presented the outcome of the work carried out by MSC-E, CEIP and CCC, including experts from Poland, on the assessment of POP pollution in the EMEP region. The presentation mainly focused on research activities on PAHs and long-term trends of POP pollution. PAH pollution assessment on a national scale had been performed as a part of a case study for Poland, focusing on the analysis of B(a)P pollution in the country. Model simulations with updated national emission inventory and scenario emissions had allowed for the improvement of model assessment of B(a)P pollution. At the same time, possible underestimation of national B(a)P emissions in Poland had been indicated based on the results of a comparison of modelled and measured concentrations. Updated results on long-term changes in measured and modelled B(a)P air concentrations had been demonstrated, with emphasis on key emission source categories and exceedances of B(a)P air quality guidelines and population exposure. Analysis of main factors responsible for long-term changes of PAH pollution in different regions of the globe was outlined, which had been carried out by MSC-E as a contribution to the activities of TFHTAP. Furthermore, participants were informed about a recent POP workshop jointly hosted by TFHTAP and MSC-E (online, 15 April 2021). The workshop had examined current work and efforts throughout the international science community aimed at addressing environmental pollution by POPs and chemicals of emerging concern on the global and regional scales. Lastly, proposals for the draft working plan on future activities with regard to POPs and cooperation with subsidiary bodies and international organizations and conventions (e.g., the Arctic Monitoring and Assessment Programme, the Baltic Marine Environment Protection Commission (HELCOM) and the Stockholm Convention on Persistent Organic Pollutants) had been presented.

53. A representative of MSC-E presented an overview of the activities on HM pollution assessment, including progress made with respect to work at CCC, CEIP, its own work, discussions within TFMM and proposals for the 2022–2023 workplan. He summarized the status of ongoing activities on HM emissions estimates, monitoring and modelling, and outlined main directions of research and cooperation. He highlighted cooperative efforts on improvement of mercury pollution assessment, including scientific cooperation on the study of mercury atmospheric chemistry and contribution to the Arctic Monitoring and Assessment Programme assessment of mercury pollution of the Arctic. He also announced a new country-scale case study of mercury pollution in Norway, initiated in cooperation with national experts and TFMM. Particular attention was paid to cooperative activities within the framework of TFHTAP. Discussions and the output of the recent workshop on mercury jointly organized by MSC-E and TFHTAP (online, 13 April 2021) were outlined and preliminary results of the analysis of long-term changes of mercury pollution in the EMEP and other regions were presented. Additionally, information on ongoing MSC-E cooperation with HELCOM and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) on assessment of HM pollution of the marginal seas was provided.

54. A representative of MSC-W presented an overview of the progress of activities during 2020/2021. An assessment for the air pollution situation in Europe, as well as source-receptor matrices for 2019, had been published in EMEP Status Report 1/2021: Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components,¹⁸ as well as in country reports (also available in Russian). As discussed under agenda item 2 (d) on condensables, the PM emissions used for that work were a revised set of residential heating emissions (REF2.1) for countries where those emissions did not clearly include condensables. Furthermore, a trend study for the period 2000–2019 had been performed using reported emissions, EMEP observations and model calculations (with PM emissions as

¹⁸ Oslo, Norwegian Meteorological Institute, 2021.

reported by the countries). MSC-W was working with CIAM to provide future (2030 and 2050) assessment of the air pollution situation in Europe, using the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) model and the finer scale methodology uEMEP. For all of the above-mentioned projects, the lack of good quality emission data (and observations) for Eastern Europe, the Caucasus and Central Asia and the Western Balkans was an issue that would need further work. The representative also presented ongoing work with CIAM on a new version of the multiscale GAINS model, where the developments for the EMEP/uEMEP modelling systems in the past years would be exploited. Furthermore, preliminary results of a study on how the different relative changes of nitrogen oxides, sulfur oxides and ammonia emissions 2005–2030 were affecting ammonium aerosol formation and N deposition were briefly presented. They would be further analysed in the next workplan period.

55. A representative of CCC presented the status of the implementation of the EMEP monitoring strategy, progress in implementing the 2020–2021 workplan and plans for work during 2022–2023. One major challenge that remained was the fact that parts of the EMEP domain did not have adequate observational capacities. EMEP data were openly available and extensively used. It was suggested that observation data be licensed in the future (CC BY 4.0). Efforts would be made to have intensive studies on ozone episodes (including precursors), chemicals of emerging concern and studies of the impacts of the pandemic on pollution levels and trends.

D. Integrated assessment modelling

56. The Co-Chairs of TFIAM and the Head of CIAM reported on the progress of work – among other things – on the contributions to the Gothenburg Protocol review, the status of the cost-of-inaction report, and the initiative to relaunch the informal network of national integrated assessment modellers. They also reported on the results of the Task Force’s fiftieth meeting (online, 21–23 April 2021). They expressed concern that, although it was possible to answer most of the Gothenburg Protocol Review Group questions addressed to TFIAM, CIAM and MSC-W, the suggested timing and available funds to formulate high quality answers might prove to be too tight. Nevertheless, the continued support from the European Commission, the Nordic Council of Ministers and the Arctic Monitoring and Assessment Programme was much appreciated.

57. For the 2022–2023 workplan, TFIAM was requested to continue to work on the review of the Gothenburg Protocol, prepare a guidance document on non-technical measures and continue to cooperate with HELCOM on marine N loads. In addition, the networking and knowledge-sharing activities of TFIAM should be continued: i.e. planning and arranging meetings of TFIAM, the Expert Panel on Clean Air in Cities and of national integrated assessment modellers.

58. For the 2022–2023 workplan, CIAM planned to continue to work on the review of the Gothenburg Protocol, contribute to the ad hoc group on condensables, prepare (jointly with TFTEI, TFEIP and TFRN) a report assessing the extent of recently implemented (by the Parties) additional measures and how they contributed to meeting obligations. In addition, CIAM, TFIAM and MSC-W would assess scenarios relevant for the Gothenburg Protocol, applying the revised and extended multi-scale version of GAINS and EMEP/uEMEP models.

59. The third meeting of the Expert Panel on Clean Air in Cities would be held virtually in November 2021. A national integrated assessment modellers workshop on health impact assessments was being planned. Several national experts had already expressed an interest in

arranging an integrated assessment modelling tutorial webinar. Those interested were requested to contact Mr. Stefan Åström – TFIAM Co-Chair.¹⁹

E. Condensables in emission inventories and modelling

60. The Chair of the EMEP Steering Body provided an introduction to the issue of condensables. She pointed out the challenges that condensables posed in both emissions and modelling and that there were two distinct aspects: one scientific and the other policy-related. The EMEP Steering Body focused on the scientific aspect, while the policy implications should be dealt by the policy bodies of the Convention. EMEP centres, supported by national experts, had proposed a road map with respect to inclusion of condensables in EMEP emissions and modelling, with the short- and long-term steps to be taken.²⁰ The progress in activities and future work on condensables was presented by the Head of CEIP on behalf of CEIP, CIAM, TFEIP, TFMM, MSC-W and the Netherlands Organization for Applied Scientific Research (TNO). The main messages included:

(a) In 2021, 23 Parties had provided information on the inclusion of the condensable component in PM emission, however, often that information was not entirely clear; available information has been improving slowly over the years, especially since the update of the EMEP/EEA Guidebook in 2019;

(b) In 2020, EMEP had used the TNO Ref2 data in an initial estimate for residential combustion emissions (GNFR section C), while, in subsequent years, those top-down estimates should be increasingly replaced by national estimates;

(c) In early 2021, an update for Ref2 for 2015 had been made (“Ref2.1”) for five countries (Austria, Finland, France, Germany and the Netherlands) based on new information received and bilateral consultations; a new Nordic Council of Ministers-funded project (to be completed in early 2022) should support use of the same consistent approach for all countries and also to produce time series: 2005–2018/19;

(d) Building-up an updated emission inventory to be used for modelling applications in 2021, was based on the following process: CEIP had checked and if a Party confirmed that the condensable component was included in its emission estimates for the residential combustion emissions then the data reported by the Parties had been used, otherwise Ref2 emissions had been used; In total, for 26 Parties, their national data sets had been used, for 17 Parties Ref2 estimates had been used and, in 5 cases, data had been missing and they had been gap-filled;

(e) Including a revised (Ref2) estimate was time consuming but necessary, given the improvement of the comparison between modelled and measured PM concentrations; for a significant number of Parties, the PM emissions (for small combustion only) used in the assessments were still not based on their national emission inventory submissions;

(f) Parties needed to be aware of the policy implications, for example, changes in source apportionment, impact on policies and measures, etc.

61. In the discussion that followed the following comments were made:

¹⁹ Contactable at stefan.astrom@ivl.se.

²⁰ See key message No. 13 in David Simpson and others, EMEP Technical Report MSC-W 4/2020: How should condensables be included in PM emission inventories reported to EMEP/CLRTAP? – informal document under agenda item 2 (d).

- (a) Acknowledgments to the Nordic Council of Ministers for supporting the crucial work on condensables;
- (b) A representative of the European Commission referred to the key role of the possible policy implications and mentioned the role of the ad hoc group on condensables led by the Chair of the Steering Body. The group should play a coordination role among Convention task forces that were engaged in work on condensables, and should serve as a bridge between Parties and the science bodies and groups. The European Commission offered to host a technical workshop in February 2022 to speed up the technical discussions. The workshop agenda would be developed together with the Chairs of EMEP and CEIP;
- (c) Revised 2005 emission estimates with condensables were crucial to assess whether there was a need to update the emission reduction commitments for PM in the context of the Gothenburg Protocol review and its possible revision; Such data should be established in 2022 to run first scenarios in the perspective of the review of the Gothenburg Protocol;
- (d) The first meeting of the ad-hoc group would be held within the next few weeks with invited TFTEI and national experts;
- (e) To assess the historical trend data (including 2005), it was crucial not only to apply the revised emission factors but also relevant activity data, including information on types of stoves and boilers and related statistics;
- (f) It should be noted that a significant amount of reported national emission data had not been used in EMEP 2021 assessments.

F. Hemispheric transport of air pollution

62. Mr. Terry Keating (United States of America), Co-Chair of the Task Force on Hemispheric Transport of Air Pollution (TFHTAP), introduced Mr. Tim Butler (Germany), who had taken on the role of Co-Chair of the Task Force, and Ms. Rosa Wu (Canada), who has taken on the role of Vice-Chair of the Task Force, along with Mr. Jacek Kaminski (Poland). Mr. Keating and Mr. Butler provided an overview of the Task Force's progress on elements of the 2020–2021 workplan, including the outcomes of its online meetings in March and April 2021 and some preliminary results of ongoing work. Mr. Keating presented an overview of the elements proposed for the 2022–2023 workplan, including continued work on global emissions inventory development, global and regional model evaluation and intercomparison and global scenario assessment.

63. The Steering Body and Working Group:

- (a) Welcomed the progress on the workplan elements contributing to the review of the Gothenburg Protocol and the attribution of trends to changes in extraregional sources, including the intercontinental impacts of marine shipping and methane sources;
- (b) Expressed appreciation for the contributions of the European Commission Joint Research Centre to the ongoing development of the updated global emissions mosaic;
- (c) Welcomed the recommendations for further work on mercury and POPs developed through meetings organized jointly with MSC-E;
- (d) Noted the opportunities for cooperation with other subsidiary bodies, including MSC-E, MSC-W, CIAM, TFMM and TFIAM.

64. The Steering Body and the Working Group:

(a) Noted that all the status reports relevant for the evaluation of progress in implementing the 2020–2021 workplan had been prepared by the EMEP centres on time; the 2021 EMEP status and technical reports, including supplementary reports, were available on the EMEP website²¹ and listed in an informal document under agenda item 2;

(b) Welcomed and approved the progress made by EMEP centres and task forces in implementing the 2020–2021 workplan as presented during the session, in their 2021 reports and other publications and briefly described in the official documents for the seventh joint session and in the 2021 joint report on contribution to the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (ECE/EB.AIR/GE.1/2021/3–ECE/EB.AIR/WG.1/2021/3).

VI. Draft 2022–2023 workplan for the implementation of the Convention (science part)

65. The Steering Body and the Working Group:

(a) Discussed and endorsed the draft 2022–2023 workplan for the implementation of the Convention (science part) (EB.AIR/GE.1/2021/18–ECE/EB.AIR/WG.1/2021/11) as amended during the session. The modifications and additions referred to CDM, CEIP, CIAM, ICP Modelling and Mapping, ICP Vegetation, ICP Waters, MSC-E, TFHTAP, TFIAM, TFMM, cooperation with HELCOM and OSPAR, and contribution to the forum for international cooperation on air pollution;

(b) Decided to forward the draft 2022–2023 workplan for consideration and approval by the Executive Body at its forty-first session.

VII. Joint thematic session: contribution of scientific bodies to the review of the Gothenburg Protocol

66. The goal of the session was to review and discuss the contributions of the two scientific bodies to the review of the Gothenburg Protocol. The session gave the scientific centres, task forces and ICPs the opportunity to present results and conclusions from their work relevant to the review.

67. Ms. Kimber Scavo, the Chair of the Gothenburg Protocol Review Group, presented information on the scope and content of the review. The Review Group had developed a preparatory document on the review entitled “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) to facilitate the discussion. Annex I to the preparatory document provided a list of questions to the subsidiary bodies under the Convention that could be helpful to those bodies in preparing for the review. The Review Group had drafted the “Draft report on the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, as amended in 2012”²² for the forty-first session of the Executive Body. The part of the document related to science had been developed based on inputs provided by the scientific centres and task forces under the Convention. She presented issues for EMEP and the Working Group on Effects, and requested to correct and improve – where needed – the text in the document, in particular, regarding paragraphs 25,

²¹ See www.emep.int.

²² See informal document “Draft report on the review of the Gothenburg Protocol prepared by the GP Review Group for the 7th joint session” (Draft 1) under agenda item 7.

28 and 47 and table 3.1. She also presented a draft outline of the review report, and the time frame and process for submitting additional input for the review.

68. The Chairs of the EMEP Steering Body and of the Working Group on Effects opened the discussion on the contribution, recalling the inputs already made and the tasks still to be completed. The following discussion focused on the already prepared and planned answers to questions formulated by the Review Group.²³ Some of the answers had been provided before the summer of 2021, some further information would be provided by the end of 2021, while some other information would only be available in the spring of 2022.

A. Contributions by the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

69. The EMEP centres and task forces reported on the related work in progress and on planned outputs in the coming months. The issues discussed included:

- (a) Trends in air pollutant emissions (information presented by CEIP, supported by TFEIP);
- (b) Analysis of the quality of emission inventory processes as implemented by Parties and recommendations for further improvements (TFEIP, CEIP);
- (c) Trends in air pollutants concentrations and depositions – comparison with emission trends (MSC-W, CCC, CIAM, MSC-E, TFIAM, TFMM);
- (d) Attribution of trends to changes in extraregional sources, including the intercontinental impacts of marine shipping and methane sources (TFHTAP).

B. Contributions by the Working Group on Effects

70. The scientific centres and task force reported on the related work in progress²⁴ and on planned outputs in the coming months. The issues discussed included:

- (a) Observed and projected trends in damage to materials and cultural heritage due to air pollution above critical levels and loads (ICP Materials);
- (b) Exceedance of critical loads and change in water quality (ICP Waters);
- (c) Observed and predicted trends in risk to vegetation (ICP Vegetation);
- (d) Observed (between 1990 and 2018/2019) projected (up 2030) exceedances of critical loads for acidification and eutrophication and changes in water, soil and ecosystem quality indicators (ICP Integrated Monitoring);
- (e) Observed long-term trends in throughfall deposition of sulfate and inorganic N; and observed and projected trends in vegetation risk of damage due to ozone (ICP Forests);
- (f) Sufficiency of the monitoring and modelling system of the Convention to observe, assess and project air pollution and its effects related to the Gothenburg Protocol in the ECE region (summary response elaborated by ICP Integrated Monitoring);

²³ *ibid.*

²⁴ See informal document “Working Group on Effects - Extended information from ICPs and TFs in response to questions raised in the frame of the amended Gothenburg Protocol review.” under agenda item 7

(g) Population exposure and assessments of mortality and morbidity risks for PM_{2.5}, nitrogen dioxide and ozone (Task Force on Health);

(h) Exceedance of critical loads for acidification and eutrophication between 2000 and 2018/2019 in terms of percentage of ecosystems with exceedances and accumulated excess, based on current critical loads in the ECE region (ICP Modelling and Mapping).

71. The EMEP Steering Body and the Working Group on Effects:

(a) Took note of the information provided by centres, task forces and the international cooperative programmes during the thematic session and of their contributions to the first draft of the Gothenburg Protocol review report (ECE/EB.AIR/2021/4);

(b) Noted considerable progress in the preparation of the contribution to the second draft of the Gothenburg Protocol review (due on 10 January 2022);

(c) Took note of the ongoing contributions that would be completed only in 2022, in particular those related to information for the eastern part of the ECE region and projected trends for 2030 and 2050;

(d) Requested that the contributions be further discussed during the 2022 meeting of the Bureaux of the EMEP Steering Body and of the Working Group on Effects.

C. Contribution by Germany

72. A representative of Germany recalled the rationale for including marine ecosystem protection in the Gothenburg Protocol review. She presented the main messages of the joint report of the Ad hoc Group on Marine Protection under the Convention and the Reduction Scheme Core Drafting Group under HELCOM (informal document under item 7). Both OSPAR and HELCOM were willing to cooperate with the Convention and cooperation with HELCOM Working Groups had already started. Effects indicators for marine eutrophication could be combined with critical loads of eutrophication and used in exceedance calculations for various scenarios both with and without taking into account Baltic Sea eutrophication. Future work on marine eutrophication could be performed on three levels of complexity, but only a simple approach including exceedance analysis for different N emission scenarios could be applied within the time frame of the Gothenburg Protocol review.

73. The Steering Body and the Working Group on Effects:

(a) Took note of the informal paper “Options to consider marine eutrophication in the review of the Gothenburg Protocol” describing the progress of work in that respect;

(b) Welcomed the readiness of HELCOM Working Groups, the Reduction Scheme Core Drafting Group and the Project Implementation Group to cooperate with the Convention Ad hoc Group on Marine Protection and recommended continuing the cooperation with HELCOM Working Groups (and later on also with OSPAR) beyond the year 2022;

(c) Noted that a full integrated assessment modelling would require more time than expected and recommended that the Ad-hoc Group on Marine Protection and TFIAM should cooperate with TFRN (Expert Panel on Nitrogen Budgets), which had information on all N fluxes and also costs of N emission reduction available.

VIII. Conclusions and recommendations

74. The secretariat presented the draft conclusions and recommendations from the seventh session – see the respective presentation and informal document “Draft conclusions and recommendations 2021” under agenda item 8. The Steering Body and the Working Group on Effects agreed on the main conclusions drawn and recommendations made during their seventh session.

IX. Information-sharing by Parties

75. The information presented by Parties could be found in the informal document under agenda item 9.

X. Closing of the seventh joint session

76. The Chairs of the EMEP Steering Body and the Working Group on Effects closed the online seventh joint session. The two bodies would hold their eighth joint session in Geneva, from 12 to 16 September 2022.
