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### **Economic Commission for Europe**

Executive Body for the Convention on Long-range  
Transboundary Air Pollution

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

**Working Group on Effects**

**Eighth joint session**

Geneva, 12–16 September 2022

### **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 eighth 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 eighth joint session from 12 to 16 September 2022, in Geneva and online.

### A. Attendance

2. The session was attended by representatives of the following Parties to the Convention: Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, European Union, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America. A representative of Türkiye was also present.

3. Also participating were representatives of the following EMEP centres and task forces: 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); the Meteorological Synthesizing Centre-West (MSC-W); the Task Force on Measurement and Modelling (TFMM); the Task Force on Emission Inventories and Projections (TFEIP); and the Task Force on Integrated Assessment Modelling (TFIAM). 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 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 Portuguese Institute of the Sea and the Atmosphere, the World Health Organization (WHO) and the World Meteorological Organization (WMO).

## **B. Organizational matters**

5. The eighth joint session was held in hybrid format from September 12 to 16 September 2022. Eight two-hour-long sessions were held with simultaneous interpretation and eight one-hour-long sessions were held in English only. For more details, see the informal document entitled “Organization of work during the eighth joint session”.<sup>1</sup>

6. Ms. Laurence Rouil (France), Chair of the EMEP Steering Body, and Ms. Isaura Rábago (Spain), Chair of the Working Group on Effects, co-chaired the session. Ms. Albená Karadjova, Secretary to the Convention on Long-range Transboundary Air Pollution (Air Convention), provided opening remarks. At the invitation of the Co-Chairs, the Working Group and the EMEP Steering Body adopted the agenda for the session (ECE/EB.AIR/GE.1/2022/1–ECE/EB.AIR/WG.1/2022/1), agreeing to change the order of some agenda items.

7. The Steering Body and the Working Group on Effects subsequently adopted the report of their seventh joint session (Geneva, 13–16 September 2021) (ECE/EB.AIR/GE.1/2021/2–ECE/EB.AIR/WG.1/2021/2).

8. The delegation of Ukraine informed the Steering Body and the Working Group about the environmental impacts of the ongoing military aggression perpetrated by the Russian Federation against Ukraine.<sup>2</sup>

## **II. Progress in activities in 2022 and further development of effects-oriented activities**

### **A. Air pollution effects on health**

9. The Chair of the Task Force on Health reported on its twenty-fifth meeting (online, 10–11 May 2022) and on progress in the implementation of the 2022–2023 workplan (ECE/EB.AIR/WG.5/2021/3). Activities were related to consolidating evidence on health effects of air pollution, support to the implementation of the WHO air quality guidelines (AQGs) and tools. Work had started on updating methods for health risk/impact assessment of air pollution (an update of the Health Risks of Air Pollution in Europe project), with a focus on long-term mortality effect attributable to particulate matter (PM)<sub>2.5</sub>, PM<sub>10</sub>, nitrogen dioxide (NO<sub>2</sub>), ozone and the WHO European region. Following the launch of the AQGs in September 2021, activities to promote their uptake had included their dissemination at different forums, the organization of science-policy dialogues in member States, and the development of a compendium of resources to facilitate implementation of the AQGs. Work continued on tools for quantification of the health impacts of air pollution, including links to the climate agenda. The WHO AirQ+ software had been updated with new AQG parameters, an improved Life Table module and a Global Exposed Mortality Model function. The WHO Climate Mitigation, Air Quality and Health (CLIMAQ-H) software (previously known as Carbon Reduction Benefits on Health (CaRBonH)) had been developed using improved calculation methods of health and economic benefits of climate mitigation actions and was expected to be published by the end of 2022. To promote communication and health messages related to air pollution, a summary of the evidence on personal-level interventions to reduce ambient air pollution exposure had been developed, as well as a review of air quality

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<sup>1</sup> Information and documentation for the meeting, including informal documents and presentations, are available at <https://unece.org/info/events/event/360936>.

<sup>2</sup> The statement is available on the web page of the session.

indices of countries in the WHO European region, to be published in 2023. In addition, *Human Health Effects of Polycyclic Aromatic Hydrocarbons as Ambient Air Pollutants: Report of the Working Group on Polycyclic Aromatic Hydrocarbons of the Joint Task Force on the Health Aspects of Air Pollution* had been published.<sup>3</sup>

10. The Steering Body and the Working Group:

- (a) Noted the progress in implementation of the 2022–2023 workplan and emphasized the importance of the multi-pollutant approach;
- (b) Encouraged the Task Force on Health to consider linkages to climate change mitigation, CLIMAQ-H and integrated assessment modelling.

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

11. The Chairs of the ICP Modelling and Mapping Task Force, CCE and CDM reported jointly on progress in activities in 2022, including the results of the thirty-eighth ICP Modelling and Mapping Task Force meeting, held jointly with the twenty-ninth meeting of CCE (online, 3–5 May 2022), and the third meeting of CDM (Sitges, Spain, 6–8 April 2022). The meetings had focused on addressing the main scientific challenges regarding critical loads and levels and air pollution effects, risks and trends. The work achieved under ICP Modelling and Mapping since the seventh joint meeting of the EMEP Steering Body and the Working Group on Effects 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 and levels 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 the responses of Parties to the Convention 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; and (iv) reviewing the latest scientific knowledge on effects of gaseous ammonia (NH<sub>3</sub>) concentrations on vegetation over the past 15 years to evaluate the relevance of revision of existing critical levels of NH<sub>3</sub>;
- (c) Performing critical loads exceedances calculations at 5-year intervals from 2000 until 2019 and for selected scenarios as presented in the Annex II – Policy background document to the Review of the Gothenburg Protocol,<sup>4</sup> 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 (see ECE/EB.AIR/2022/3–ECE/EB.AIR/WG.5/2022/3);
- (d) Updating 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.

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<sup>3</sup> Copenhagen, World Health Organization Regional Office for Europe, 2021.

<sup>4</sup> Available under “Informal documents” tab at <https://unece.org/info/Environmental-Policy/Air-Pollution/events/360936>.

12. It was announced that the thirty-ninth Task Force, thirtieth CCE and fourth CDM joint annual meeting would take place on 28–30 March 2023 and would be hosted by Czechia.

13. The Steering Body and the Working Group:

(a) Approved the publication *Review and Revision of Empirical Critical Loads of Nitrogen for Europe*<sup>5</sup> and recommend that the revised values be included in the Mapping Manual and be used in policy support within and outside the Convention;

(b) Took note of the *Review of Internationally Proposed Critical Levels for Ammonia: Proceedings of an Expert Workshop held in Dessau and Online on 28/29 March 2022*,<sup>6</sup> containing the latest scientific knowledge on effects of gaseous NH<sub>3</sub> concentrations on vegetation,<sup>7</sup> which supported current critical levels of NH<sub>3</sub> defined in the *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*<sup>8</sup> (Mapping Manual) and recommended further discussion of the workshop findings and their inclusion in the Mapping Manual in 2023;

(c) Took note of the current Simple Mass Balance Critical Load (CL) database 2021 and recommended its application for policy support within and outside the Convention, for example, for the EEA headline indicator CL Exceedances for the European Union Biodiversity Strategy;

(d) Encouraged Parties to communicate their National Focal Centre contacts to ICP Modelling and Mapping, CCE and CDM to enable completion of the National Focal Centre list.

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

### 1. Air pollution effects on materials

14. The Head of ICP Materials reported on developments and the outcomes of the thirty-eighth meeting of the ICP Materials Task Force (Bochum, Germany, 4–5 May 2022). He also reported on the progress of implementation of planned 2021–2022 activities, including the delivery of two reports in 2021: “Call for data ‘Inventory and condition of stock of materials at United Nations Economic, Scientific and Cultural Organization (UNESCO) world cultural heritage sites’: Part V – Application of models with increased resolution in the study of damage at selected UNESCO sites - Campania, Italy”;<sup>9</sup> and “Technical manual for the trend exposure programme 2017–2021”.<sup>10</sup> It was expected, that in 2022, the following ICP Materials reports would be finalized: “Corrosion and soiling data”; and “Study on the relationship between the environmental and the artefact on selected UNESCO sites”.

15. He also highlighted a new update of the Mapping Manual including soiling (2021) with dose-response functions for carbon steel, weathering steel, zinc, aluminium (corrosion) and modern glass, limestone, marble and coil-coated materials (soiling). A trend analysis including the new data and environmental data would be presented in 2023. A new exposure

<sup>5</sup> Roland Bobbink, Christin Loran and Hilde Tomassen, eds. (Dessau-Roßlau, German Environment Agency, 2022). Available at [https://unece.org/sites/default/files/2022-08/Review\\_and\\_revision\\_of\\_Empirical\\_Critical\\_Loads\\_red.pdf](https://unece.org/sites/default/files/2022-08/Review_and_revision_of_Empirical_Critical_Loads_red.pdf).

<sup>6</sup> Jürgen Franzaring and Julia Kössler (Dessau-Roßlau, German Environment Agency, 2022).

<sup>7</sup> See [www.umweltbundesamt.de/dokument/expert-workshop-on-ammonia-proceedings-final-draft](http://www.umweltbundesamt.de/dokument/expert-workshop-on-ammonia-proceedings-final-draft).

<sup>8</sup> Available at [www.umweltbundesamt.de/en/manual-for-modelling-mapping-critical-loads-levels](http://www.umweltbundesamt.de/en/manual-for-modelling-mapping-critical-loads-levels).

<sup>9</sup> ICP Materials Report No. 90 (Bologna, National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), 2021). Available at [www.ri.se/sites/default/files/2021-09/Report-90-UNESCO-Call-for-Data-Part-V.pdf](http://www.ri.se/sites/default/files/2021-09/Report-90-UNESCO-Call-for-Data-Part-V.pdf).

<sup>10</sup> ICP Materials Report No. 91 (Kista, Sweden, Research Institutes of Sweden (RISE), 2021). Available at [www.ri.se/sites/default/files/2021-09/Report-91A-Technical-manual-2017-2021.pdf](http://www.ri.se/sites/default/files/2021-09/Report-91A-Technical-manual-2017-2021.pdf).

analysis had also been launched, with the aim of comparing long-term data (2021–2029) for weathering steel and carbon steel.

16. An analysis of data collected at UNESCO sites presented in the current year included a study on the relationship between the environment and the artefact on three selected sites: St. Domnius Cathedral (Croatia), the Würzburg Residence (Germany) and the Royal Palace of Caserta (Italy). Despite the decrease in emissions in recent years and the slight decrease in the concentrations of atmospheric pollutants, the materials of the cultural objects studied were still partly at risk.

17. The Head of ICP Materials announced that the thirty-ninth meeting of ICP Materials would take place on 3–5 May 2023, in Bochum, Germany.

18. The Steering Body and the Working Group took note of the reports:

(a) “Corrosion and soiling data from the exposure for trend analysis 2017–2021” (2022);

(b) “Call for Data – Part VI: Study on the relationship between the environmental and the artefact on selected UNESCO sites” (2022).

## 2. Air pollution effects on forests

19. A representative of ICP Forests<sup>11</sup> summarized the highlights of the thirty-eighth Task Force Meeting (online, 2–3 June 2022) and presented the key deliverables of the Programme Coordinating Centre, such as ICP Forests Brief No. 5 entitled “Tree health is deteriorating in the European forests”,<sup>12</sup> the results of the twenty-fourth needle/leaf interlaboratory comparison test, the results of the tenth soil interlaboratory test, the result of the eleventh atmospheric deposition and soil solution ring test, the Database report, and the contribution of ICP Forests to the review of the Gothenburg Protocol. Moreover, he highlighted the main activities of ICP Forests over the past 12 months and presented the content of the publication entitled *Forest Condition in Europe: The 2022 Assessment: ICP Forests Technical Report under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention)* (Technical Report 2022),<sup>13</sup> which contained data from 27 of the 42 member countries of ICP Forests, a list of the 70 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 2020; (b) the tree crown condition in 2021; and (c) history and progress of the ICP Forests ring test programme. He showed with examples (reports and articles) how ICP Forests contributed to the implementation of the Air Convention workplan.

20. He also briefed participants on cooperation with EMEP (MSC-West), including ongoing data sharing. There were plans to organize a joint workshop on deposition measurements in 2022. In general, EMEP data could be useful for ICP Forests in closing data gaps, as well as for improving models. The EMEP Chair had supported that point and agreed that said area of collaboration should be further developed.

21. The Steering Body and the Working Group:

(a) Took note of the ICP Forests publications,<sup>14</sup> including the ICP Forests Technical Report 2022;

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<sup>11</sup> See <http://icp-forests.net/>.

<sup>12</sup> Nenad Potočić and others (Eberswalde, Thünen Institute, 2021).

<sup>13</sup> Alexa Michel and others, eds. (Eberswalde, Thünen Institute, 2022).

<sup>14</sup> See <http://icp-forests.net/>.

(b) Recommended closer collaboration between EMEP and ICP Forest on nitrogen deposition.

**3. Air pollution effects on waters and integrated monitoring of air pollution effects on ecosystems**

22. The Chair of ICP Waters reported on its activities, including the results of its thirty-eighth Task Force meeting held jointly with the thirtieth Task Force meeting of ICP Integrated Monitoring (Miraflores de la Sierra, Spain, 10–12 May 2022). She presented a status report on recent progress in ICP Waters, in particular on recent activities related to key messages from the Task Force meeting, the nitrogen report on trends and spatial variation in lake nitrate, the ongoing report on biological recovery and responses to changing water chemistry and planned activities for 2023 and onwards. ICP Waters Report No. 149/2022<sup>15</sup> showed that levels and changes in lake nitrate were primarily related to nitrogen deposition, that climate and land cover were also important, and that there was a risk of elevated leaching of nitrate in the future as a consequence of climate and ecosystem disturbances. The ongoing analysis on biological recovery indicated that biological recovery was most distinct where chemical recovery was largest, and that recovery of lakes was slower than recovery in running waters. Also, the preliminary results indicated significant change in functional diversity of aquatic biological communities. The results would be published in an ICP Waters report. The next report planned from ICP Waters (2023) would be on base cations. It was announced that ICP Waters would work on an update of the ICP Waters Programme Manual 2010<sup>16</sup> in 2023 and onwards. A joint analysis on nitrogen for ICP Waters, ICP Forests and other Working Group on Effects-EMEP bodies was proposed and would be discussed in 2023.

23. In the subsequent discussion, the importance of building on the work done by the European Union, including under its Water Framework Directive,<sup>17</sup> was emphasized, particularly to ensure coherent methodological approaches.

24. The Chair of ICP Waters announced the Task Force meeting to take place in Austria together with ICP Integrated Monitoring on 11–13 May 2023.

25. The Steering Body and the Working Group:

(a) Took note of the Report on trends and regional patterns in nitrogen deposition and effects and of the upcoming thematic report on biological recovery and responses to changing water chemistry;

(b) Also took note of the plans to commence the following activities in 2023: (i) update of the ICP Waters Programme Manual 2010; and (ii) possible joint analysis on nitrogen for ICP Waters, ICP Forests and other Working Group on Effects-EMEP bodies.

26. The new Head of the ICP Integrated Monitoring Programme Centre introduced himself and gave a presentation on the main activities and progress related to the 2022–2023 workplan, including:

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<sup>15</sup> Kari Austnes and others, *Nitrogen in Surface Waters: Time Trends and Geographical Patterns Explained by Deposition Levels and Catchment Characteristics* (Oslo, Norwegian Institute for Water Research (NIVA), 2022).

<sup>16</sup> ICP Waters Report No. 105/2010 (Oslo, NIVA, 2010).

<sup>17</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, *Official Journal of the European Communities*, L 327 (2000), pp. 1–73.

- (a) Highlights from a scientific study showing negative effects on forest bryophytes from nitrogen deposition, based on ICP Integrated Monitoring and ICP Forests data;
- (b) The successfully completed relocation of the ICP Integrated Monitoring Programme Centre from the Finnish Environment Institute to the Swedish University of Agricultural Sciences, including an updated monitoring manual, a rebuilt database and a new website;
- (c) The workplan activity operationalizing the extended integrated modelling initiative was progressing, with interest from six countries to join as of September 2022;
- (d) A scientific paper on modelling and assessment of biodiversity and ecosystem impacts was still in preparation;
- (e) Continued analysis of trends in ecosystems, connected to the review of the Gothenburg Protocol;
- (f) Plans for continued work on critical load exceedances and empirical ecosystem impact indicators, in cooperation with other ICPs and EMEP;
- (g) Ongoing collaboration with Environment and Climate Change Canada and the University of Toronto (Canada) to install passive air samplers for gaseous mercury at integrated monitoring sites;
- (h) Continued work on mercury and other heavy metals.

27. The upcoming work on developing a multi-pollutant and multi-effect approach, as well as ongoing work related to mercury, was considered to be particularly interesting and to cut across multiple task forces. A representative of Germany announced a study carried out in collaboration with ICP Forests on wet mercury deposition under the crown of forest in Germany, with a methodology developed, which had been included in the ICP Forests Manual.

28. A representative of the European Union expressed gratitude to ICP Integrated Modelling and other ICPs for help in shaping the reporting template under European Union legislation. The speaker look forward to continued support to member States from ICPs on reporting and analysis. As a part of guidance provided to them, European Union member States were encouraged to seek synergies and align with ICP Integrated Modelling sites.

29. The Steering Body and the Working Group took note of the successfully completed relocation of the ICP Integrated Monitoring Programme Centre from the Finnish Environment Institute to the Swedish University of Agricultural Sciences, including an updated monitoring manual, a rebuilt database and a new website.

#### **4. Air pollution effects on vegetation**

30. The Chair of the ICP Vegetation Task Force reported on its activities, including the results of its thirty-fifth Task Force meeting (online, 21–23 February 2022). ICP Vegetation had completed a post hoc analysis for the review of the Gothenburg Protocol using ozone concentration and ozone flux data received from EMEP. Analysis had been carried out for wheat production and for growth of forest trees. Additional information and parameterizations to improve and extend ozone risk assessment to vegetation had been added to the background document of chapter 3 of the Modelling and Mapping Manual. The heavy metals in mosses 2020/21 survey was underway (extended to 2022). Approximately 3,500 samples had been collected already. The survey included a pilot study on the microplastics content of mosses. Additional moss samples were being collected in 2022 for a study on



microplastic content. Outreach activities continued to raise awareness and to share skills and expertise.

31. The Steering Body and the Working Group took note of:

(a) The ongoing survey on heavy metals in mosses 2020/21, which had been extended to 2022;

(b) A pilot study on the microplastics content of mosses.

#### **D. Working Group on Effects web portal**

32. The Head of CDM reported on the status of development of the common Working Group on Effects portal. The portal had been developed by CDM, supported by ICP Forests and a Vice-Chair of the Working Group. The main purpose of the web portal 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 proposed update to the web portal would change its layout and structure to a theme-based one (monitoring, modelling and impact indicators). The draft updated web portal would be presented at the next Extended Bureaux meeting in 2023.

33. In general, meeting participants supported the new portal. Proposals for further improvement included emphasizing data available through the portal, as many users would likely be looking for data (e.g., by adding a tab entitled “Data”), as well as emphasizing outreach, communications and indicators. ICP Materials, ICP Waters and CCE had expressed interest in contributing to the portal’s development. The speaker said that the information available on the portal would need to be kept up-to-date and in line with individual ICPs’ websites.

34. The Steering Body and the Working Group:

(a) Agreed to proceed with the implementation of the proposed web portal and requested the ICPs and the Task Force on Health to provide feedback by January 2023;

(b) Requested CDM to develop an updated version of the web portal, to be considered at the Extended Bureau meeting in 2023.

### **III. Cooperation with the European Union and the Integrated European Long-term Ecosystem, Critical Zone and Socioecological Research Infrastructure**

35. The Working Group on Effects Chair provided information on possible further cooperation between the ICPs and the European Union on long-term ecosystems monitoring. She presented a proposal for collaboration with the Integrated European Long-term Ecosystem, Critical Zone and Socioecological Research Infrastructure (eLTER RI), proposing a letter of cooperation between the Working Group on Effects and eLTER RI.

36. The eLTER European Strategy Forum for Research Infrastructures (ESFRI) process coordinator presented eLTER and common points of interest with the Working Group on Effects, including ecosystem monitoring. The Swiss Federal Institute for Forest, Snow and Landscape Research was in charge of choosing suggested methodology and collating manuals from key players, such as the Working Group on Effects or the Integrated Carbon Observation System. Where possible, not only the standard observation but also the related method would be chosen from existing players. No mechanisms would be imposed on participating parties.

37. A representative of Finland noted that there were clear benefits of collaboration between eLTER and the Air Convention, and welcomed future cooperation.

38. A representative of Germany inquired whether the Working Group on Effects could participate in the eLTER Preparatory Phase Project (eLTER PPP) – a European Union-funded project dedicated to forging eLTER into a legal entity. The eLTER ESFRI process coordinator informed participants that eLTER PPP had organized expert groups for consulting with scientific communities. Those expert groups covered freshwater ecology, mountain research, agroecology and critical zone research. Further groups were being established.<sup>18</sup>

39. The Steering Body and the Working Group:

(a) Welcomed the prospect of cooperation between the Working Group on Effects and eLTER RI;

(b) Invited the Chair of the Working Group on Effects to sign the letter of cooperation on behalf of the Working Group;

(c) Recommended including items on cooperation with eLTER RI in the new workplan to be developed in 2023, and requested ICP Integrated Monitoring to identify potential lines of cooperation with eLTER RI.

#### **IV. Updated strategy for scientific bodies under the Convention**

40. The Chair of the EMEP Steering Body presented the draft updated Strategy for scientific bodies under the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/GE.1/2022/18–ECE/EB.AIR/WG.1/2022/11). She recalled that, at their fifth joint session (Geneva, 9–13 September 2019), the EMEP Steering Body and the Working Group on Effects had decided to prepare updates to the strategies for EMEP and for the Working Group.<sup>19</sup> Furthermore, in 2020, the Extended Bureaux of the Working Group on Effects and of the Steering Body to EMEP had agreed that the updated strategies should be combined into a single document. She also noted that the draft updated Strategy for scientific bodies under the Convention had been prepared by the Chairs of the EMEP Steering Body and the Working Group on Effects based on inputs from centres and task forces. She also recalled the EMEP Monitoring Strategy 2020–2029 (ECE/EB.AIR/2019/4), which had previously been adopted through decision 2019/1.<sup>20</sup>

41. Several comments to the document were brought up for discussion, based on which the revised Strategy was presented by the EMEP Steering Body Chair on Friday, 16 September, and approved by the Steering Body and the Working Group.

42. The Steering Body and the Working Group:

(a) Approved the Strategy as amended during the session and agreed to forward the finalized version to the Executive Body for adoption at its forty-second session (Geneva, 12–16 December 2022);

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<sup>18</sup> For additional information, contact Mr. Mark Frenzel of the Helmholtz Centre for Environmental Research at [mark.frenzel@ufz.de](mailto:mark.frenzel@ufz.de).

<sup>19</sup> ECE/EB.AIR/GE.1/2019/2–ECE/EB.AIR/WG.1/2019/2, para. 72 (b).

<sup>20</sup> All Executive Body decisions referred to in the present document are available at <https://unece.org/decisions>.

(b) Recommended to the task forces, EMEP centres and ICPs that they look at uncertainties as a cross-cutting issue and agreed that uncertainty management should be a priority for future workplans.

## V. Financial and budgetary matters

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

43. The secretariat introduced section I of the note on financial and budgetary matters (ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12). The proposed schedule of mandatory contributions for 2023–2024<sup>21</sup> had been calculated on the basis of the 2021 United Nations scale of assessments.<sup>22</sup>

44. The EMEP Steering Body Chair emphasized that the EMEP budget was allocated to three internationally designated centres under the Protocol on Long-term Financing of the Cooperative Programme for the Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP Protocol) to develop scientific expertise in support of the work of the Convention and carry out science activities included in the biannual workplan adopted by the Executive Body.

45. The delegation of Ukraine noted that, while it supported most of the proposals outlined in the note on financial and budgetary matters, it was not in a position to support the allocation of funds to the Meteorological Synthesizing Centre-East (MSC-East), as that establishment was situated on the territory of the Russian Federation.

46. The delegation of the Russian Federation stressed that MSC-East was a scientific institution, independent from the Government of the Russian Federation, and called upon Parties to refrain from any decision that would discriminate the center.

47. The delegation of the United States of America proposed forwarding the draft details of the EMEP budget to the Executive Body, which might wish to consider alternative options for the 2023 budget allocation at its forty-second session, before making a decision.

48. The Steering Body and the Working Group:

(a) Took note of the information on the status of contributions to the financing of EMEP provided in document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12 and the additional information provided by the secretariat during the current session;

(b) Approved the use of resources by the EMEP centres in 2021, as presented in table 2 of document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12;

(c) Recommended that the Executive Body agree on the schedule of mandatory contributions from Parties for 2023, as presented by the secretariat;

(d) Called upon the Parties to the EMEP Protocol to consider making voluntary contributions (in kind or in cash through the trust fund) to ensure that the work, especially the difficult tasks required in 2023, could be accomplished as foreseen in the workplan;

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<sup>21</sup> ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12, table 4.

<sup>22</sup> See General Assembly resolution 76/238 on the scale of assessments for the apportionment of the expenses of the United Nations (A/RES/76/238).

- (e) Took note of the interventions by the delegations of Ukraine, the Russian Federation and the United States of America;
- (f) Agreed to forward the draft detailed budget for EMEP for 2023 as presented in table 3 of document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12 to the Executive Body for further consideration;
- (g) Noted that alternative options for the draft detailed budget for EMEP for 2023 might be discussed by the Bureau of the Executive Body to be considered by the Executive Body at its forty-second session;
- (h) Acknowledged the valuable scientific work carried out by MSC-East for the Convention;
- (i) Urged Parties that had not yet done so to pay their 2022 contributions in cash to the trust fund and, in 2023, to pay their contributions so that they reached the trust fund in the first half of the year;
- (j) Urged Parties in arrears to pay them in full to the trust fund;
- (k) Recommended that the Executive Body amend the EMEP Protocol by adopting, in accordance with article 4 (3) of the Protocol, the revised annex set out in the annex to document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12.

## **B. Funding of effects-related activities**

49. The secretariat introduced section II of the note on financial and budgetary matters (ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12). The secretariat reported on the proposed budget for funding of effects-oriented activities in 2023 (\$2,358,700). The details of the budget were presented in document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12, table 10.

50. A representative of ICP Modelling and Mapping, supported by other ICPs, expressed concern with regards to the signature of memorandums of understanding with centres late in the year, which left very little time for implementation of activities considering end of the year budget closure. The secretariat outlined the complexity of the procedure and emphasized low staffing capacity, noting that it was unlikely to be able to sign memorandums of understanding much earlier in the future.

51. The funding application procedure was discussed; the secretariat referred to the increased complexity of the process and emphasized the importance of respecting the specific financial categories in financial statements.

52. The Steering Body and the Working Group:

- (a) Noted the cash contributions to the trust fund for effects-oriented activities in 2021 and 2022 made by a number of Parties, and encouraged the remaining Parties to ensure that contributions were made in due time, taking into account that the continuation of ICPs was dependent on long-term funding;
- (b) Approved the 2023 essential international coordination costs of \$2,358,700 for different elements of the effects-oriented activities and the provisional cost estimate of \$2,358,700 for 2024 and 2025, for submission to the Executive Body;
- (c) Recommended to the Executive Body to agree on the recommended scale of contributions to the trust fund for core activities not covered by the EMEP Protocol for 2023, as outlined in document ECE/EB.AIR/GE.1/2022/19–ECE/EB.AIR/WG.1/2022/12, table

12, and to revise decision 2002/1 to reflect the new scale of contributions based on the 2021 United Nations scale of assessments;

(d) Invited all Parties to provide the recommended contributions to the trust fund before 30 November of each year;

(e) Noted with appreciation the essential support provided to the Convention and its bodies by lead countries, countries hosting coordinating centres and those countries organizing meetings, as well as countries that funded activities of their National Focal Centres/Points and the active participation of national experts.

## **VI. 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**

53. The Chair of the Executive Body for the Convention presented highlights of the forty-first session of the Executive Body for the Convention (Geneva, 6–8 December 2021) (ECE/EB.AIR/148).

54. The Chair of the Working Group on Strategies and Review briefed participants on the outcomes of the sixtieth session of the Working Group (Geneva, 11–14 April 2022), which had focused in particular on the Gothenburg Protocol review. He noted that said review had also encompassed the operations of the Convention.

55. The Chairs of the EMEP Steering Body and the Working Group on Effects presented the outcomes of the Joint Meeting of the Extended Bureaux of the EMEP Steering Body and the Working Group on Effects (Geneva, 21–24 March 2022). They noted that 2022 had been mainly devoted to the Gothenburg Protocol review and the development of the updated strategy for scientific bodies under the Convention.

## **VII. Joint thematic session**

### **A. Contribution of scientific bodies to the review of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, as amended in 2012**

56. The Chair of the Gothenburg Protocol review group presented information on the status of the review process and of the documents. The Vice-Chair of the Bureau of the Working Group on Strategy and Reviews provided an overview of a preparatory document developed by the review group entitled “Scientific information for the review of the Gothenburg Protocol” (ECE/EB.AIR/GE.1/2022/3–ECE/EB.AIR/WG.1/2022/3). The Co-Chair of the Task Force on Integrated Assessment Modelling presented the content of Annex II: Technical information for the review of the Gothenburg Protocol,<sup>23</sup> which aimed to provide additional policy-relevant information to supplement the conclusions contained in the Gothenburg Protocol review report.

57. An additional session to discuss contributions to the Gothenburg Protocol review was organized and ICP Materials, ICP Vegetation, ICP Waters and ICP Modelling and Mapping (CCE and the Ad Hoc Group on Marine Protection) presented their findings.

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<sup>23</sup> See “Informal documents” tab on meeting web page.

58. The Steering Body and the Working Group:

(a) Agreed on the content of the document entitled “Scientific information for the review of the Gothenburg Protocol” and decided to forward it to the Executive Body for adoption at its forty-second session;

(b) Agreed to develop a report based on ICPs’ inputs into the Gothenburg Protocol review and requested the Extended Bureaux to decide on how to proceed with producing such a report and to communicate that decision at the ninth joint EMEP Steering Body/Working Group on Effects meeting.

## **B. Access to data**

59. A representative of CCC made a presentation on Open data and the principles of findability, accessibility, interoperability and reusability as applied to EMEP observation data. All ICPs and centres provided an overview of the approaches currently implemented in their work to facilitate open access to data. The general opinion on open access and the following of the abovementioned principles for data access was positive. There were, however, certain concerns regarding open access to data, including misinterpretation or misuse of data, as well as considerations of cost. However, full open access was not necessarily costly. Higher costs would be incurred if limitations to access were to be enforced, which should be avoided, or if a user-friendly interface were to be developed and maintained. Interfaces could be limited to key data and developed over time.

60. More ICPs currently had a policy where users must apply for access to data, which was normally granted. From a data user perspective, it could, however, be problematic to base a commitment, curriculum or application on the use of data without knowing if or when access would be granted and if the data could be used as intended. In addition, it was probably a breach of European Union legislation and the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) to signal and enforce a limitation on access. The same purpose might be served by a registration/login procedure.

61. Open access to data would be a good way to promote knowledge of work done under the Working Group on Effects, increase the use of data for advisory, science and teaching purposes, and thereby further justify the work, and for the continuation of the programmes.

62. The Steering Body and the Working Group:

(a) Noted with appreciation initiatives by ICPs and the centres on open access to data;

(b) Agreed that open access to data elaborated by the science bodies should be further developed as an important objective of the science strategy and to support dissemination of Convention data;

(c) Agreed that the question should be further investigated in future workplans;

(d) Took note of the intention of the Norwegian Institute for Air Research as the host institution of CCC to issue the creative commons CC4.0 Open data licence on EMEP observation data;

(e) Recommended investigating said procedure for all observation data.

## VIII. Outreach activities, information-sharing and cooperation with other organizations and programmes

63. A representative of WMO presented updates from the WMO Global Atmosphere Watch Programme – a research programme focused on enabling atmospheric composition services for society through improved understanding of the roles of aerosols, reactive gases and greenhouse gases in the “Earth system”.

64. The Deputy Executive Secretary of the Arctic Monitoring and Assessment Programme (AMAP) emphasized the continued desire of the Arctic countries to support work under international conventions addressing climate and pollution issues, including the Air Convention. He noted that work under the Arctic Council and its subsidiary bodies (including AMAP and the Expert Group on Black Carbon and Methane) was currently on hold due to the international political situation. He also briefed participants on the European Union-funded Arctic Black Carbon impacting on Climate and Air Pollution project (ABC-iCAP) implemented in the period 2022–2023.

65. The Co-Chair of the Open-Ended Scientific Group under the Minamata Convention on Mercury presented the Scientific Group’s tasks and progress in evaluating the effectiveness of the Minamata Convention. He called on the Working Group on Effects/EMEP to provide assistance in commenting on the draft evaluation once it was available, and in enlisting experts to the roster, noting that any Party or organization could nominate an expert.

66. The Ad Hoc Group on Marine Protection coordinator, Ms. Gudrun Schuetze, introduced and acknowledged the cooperation of the Ad Hoc Group with the Baltic Marine Environment Protection Commission (HELCOM) Working Group on the Reduction of Pressures from the Baltic Sea Catchment Area and Reduction Scheme Core Drafting Group. HELCOM had enshrined the aim of close cooperation with the Air Convention in the Baltic Sea Action Plan (updated in 2021), which promoted the “inclusion of the protection of the Baltic Sea ecosystem as an additional criterion in the process of the revision of the emission targets for nitrogen in the Gothenburg Protocol”.<sup>24</sup> As a first step in that direction, estimates of Average Accumulated Exceedance of preliminary Critical Atmospheric Inputs of nitrogen could be calculated for Baltic sub-basins through cooperation between HELCOM and Air Convention working groups. Said cooperation should be continued, in particular aiming at further development of Critical Atmospheric Inputs, including the most sensitive receptors (coastal waters) and cost-optimized emission reduction allocations by integrated assessments and evaluation of the risks to coastal areas. CCE would take over the task of coordinating that work.

67. The Steering Body and the Working Group:

(a) Noted with appreciation the existing cooperation with WMO and the Arctic Council – especially in the framework of AMAP – as well as with HELCOM, and encouraged further collaboration and partnerships, including with the Minamata Convention;

(b) Encouraged interested Parties to participate in the work of the Open-Ended Science Group under the Minamata Convention, including by suggesting experts for inclusion on the roster, providing data, and reviewing draft reports.<sup>25</sup>

<sup>24</sup> *Baltic Sea Action Plan: 2021 Update* (Helsinki, Baltic Marine Environment Protection Commission, 2021), p. 25.

<sup>25</sup> For additional information, please contact Mr. Terry Keating of the United States Environmental Protection Agency at [keating.terry@epa.gov](mailto:keating.terry@epa.gov).

## **IX. Information-sharing by Parties**

68. A representative of the United Kingdom of Great Britain and Northern Ireland presented the country's experience of developing new PM<sub>2.5</sub> concentration targets. The presentation covered the modelling already carried out, consideration of monitoring requirements, and the development of a population exposure reduction target, as well as an annual mean concentration target.

69. A representative of Sweden presented work on nitrogen budgets and the link to carbon sequestration in the Nordic forests where a methodology for quantifying nitrogen flows in forests, developed by TFRN, had been combined with national carbon sinks and fluxes in reporting to the United Nations Framework Convention on Climate Change (UNFCCC). All four countries investigated (Denmark, Finland, Norway and Sweden) had reported substantial annual forest carbon accumulation to UNFCCC. Nitrogen budgets based on inflows and outflows did not support the reported carbon accumulation, however. The work presented highlighted benefits of cooperation between nitrogen and carbon experts within UNFCCC and the Air Convention.

70. The Steering Body and the Working Group:

- (a) Took note of the national experiences presented;
- (b) Recommended that the work on nitrogen budgets and the linkages to carbon sequestration be considered in the follow-up to the Gothenburg Protocol review;
- (c) Recommended that the Working Group on Effects should work together with TFRN and with the climate change mitigation community on nitrogen and carbon budgets.

## **X. 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. Improvement and reporting of emission data and adjustments under the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone**

#### **1. Adjustments under the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone**

71. The Head of CEIP presented the outcome of the review of Parties' requests for adjustments under the Gothenburg Protocol to emission inventories for the purposes of comparing total national emissions with them.<sup>26</sup> The submission in 2022 had been the first submission under the 2020 emission reduction commitments. The document "Technical Guidance for Emissions Inventory Adjustments under the Amended Gothenburg Protocol: Inventory adjustments in the Context of Emission Reduction Commitments" had been prepared by TFEIP and made available to Parties on the CEIP website.<sup>27</sup> In 2022, Denmark, France, the Netherlands and the United Kingdom of Great Britain and Northern Ireland had

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<sup>26</sup> See ECE/EB.AIR/GE.1/2022/10–ECE/EB.AIR/WG.1/2022/21.

<sup>27</sup> See [www.ceip.at/technical-guidance-adjustments-erc](http://www.ceip.at/technical-guidance-adjustments-erc).



submitted new adjustment applications. The expert review team had recommended that all adjustment applications be accepted.<sup>28</sup>

72. The Steering Body and the Working Group:

(a) Approved:

(i) The 2022 new adjustment application submitted by Denmark (Agriculture 3.B.1.a/Non-methane volatile organic compounds);

(ii) The 2022 new adjustment application submitted by France (Agriculture 3.B, 3.D/Non-methane volatile organic compounds);

(iii) The 2022 new adjustment application submitted by the Netherlands (Agriculture 3.B.1.a/Non-methane volatile organic compounds);

(iv) The 2022 new adjustment application submitted by the United Kingdom of Great Britain and Northern Ireland (Agriculture 3.D.a.2.c/ammonia);<sup>29</sup>

(b) Requested Parties to follow the CEIP recommendations when preparing and submitting applications for adjustments;

(c) Requested TFEIP and CEIP to prepare draft updated templates for the reporting of approved adjustments under the emission reduction commitments ahead of the forty-second session of the Executive Body.

## 2. Improvement and reporting of emission data

73. The Co-Chair of the TFEIP reported on progress made since the last EMEP Steering Body/Working Group on Effects session in 2021, including the results of the annual meeting of the Task Force (online, 9–12 May 2022). The main focus of work would be on updating the *EMEP/EEA Air Pollutant Emission Inventory Guidebook: Technical Guidance to Prepare National Emission Inventories* (EMEP/EEA Guidebook), and Parties were invited to support the work by providing experts who could contribute to the drafting. An updated chapter would be made available in May 2023, with adoption by the EMEP Steering Body at its ninth joint meeting with the Working Group on Effects in September 2023. In the coming months, the TFEIP Co-Chairs would liaise with the emissions inventory community and users of emission inventories to obtain views on the future of emissions inventory reporting, with the intention of drafting a working paper that could support initial thinking for a new Gothenburg Protocol.

74. The Steering Body and the Working Group:

(a) Approved the document “Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution” (ECE/EB.AIR/GE.1/2022/20–ECE/EB.AIR/WG.1/2022/13) and agreed to forward it to the Executive Body for adoption;

(b) Approved the updated Annex IV emission projections reporting template, taking into account comments raised by Parties;

(c) Approved the document “Technical Guidance for Emissions Inventory Adjustments under the Amended Gothenburg Protocol: Inventory Adjustments in the Context of Emission Reduction Commitments” and agreed to forward it to the Executive Body for adoption taking into account comments raised by Parties at the session;

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<sup>28</sup> ECE/EB.AIR/GE.1/2022/10–ECE/EB.AIR/WG.1/2022/21, para. 28.

<sup>29</sup> *Ibid.*, table 9.

(d) Encouraged Parties to contribute to the update of the EMEP/EEA Guidebook by providing experts and/or results of their recent national studies/emission measurement campaigns;

(e) Requested the Extended Bureau to initiate discussions on future priorities and needs for emission work, particularly with regard to heavy metals and persistent organic pollutants (POPs) at the next Extended Bureaux meeting in 2023;

(f) Emphasized the need to ensure long-term support for the development of the EMEP/EEA Guidebook;

(g) Welcomed the Task Force initiative related to the preparation of an informal paper highlighting future emission reporting options in the perspective of the review of the Gothenburg Protocol.

75. The Head of CEIP provided information on the status of reporting of emissions data regarding their completeness and consistency. As of 9 September 2022, 47 out of 51 Parties had submitted data. No emission data had been received from Azerbaijan, Bosnia and Herzegovina, Kyrgyzstan or the Republic of Moldova. In all, 41 Parties had reported black carbon emissions. An overview of all data submitted by Parties during the 2022 reporting round could be accessed via an interactive data viewer. CEIP had noted partly improved reporting from some countries of Eastern Europe, the Caucasus and Central Asia. However, it was vital to further improve the quality of reported data. A total of 45 Parties had submitted an Informative Inventory Report (IIR). To date, only 14 Parties had provided the Declaration on the publication of the IIR.

76. In 2022, CEIP had prepared gap-filled and gridded data sets for main pollutants and PM and black carbon for the years 1990 to 2020 and for heavy metals and POPs for the year 2020. 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: Part I: Main Pollutants (NO<sub>x</sub>, NMVOCs, SO<sub>x</sub>, NH<sub>3</sub>, CO), Particulate Matter (PM<sub>2.5</sub>, PM<sub>10</sub>, PM<sub>coarse</sub>) and Black Carbon (BC) for the years 2000 to 2019”.<sup>30</sup> The impact of the coronavirus disease (COVID-19) pandemic on 2020 emissions had been considered in the gap-filling process.

77. The Head of CEIP reported on the in-depth review of PM emissions from residential heating and road transport, with a special focus on the topic of “condensables”. The new approach of the topic-centred review (ad hoc) for all Parties generally had been well received by Parties and review experts. The expert review team had concluded that, for PM emissions for Gridded aggregated Nomenclature For Reporting (GNFR) sector C (Other stationary combustion) for 25 Parties, the data reported by the Party should be used for the data set for EMEP models as the condensable component was included consistently enough. For the other Parties, the Netherlands Organization for Applied Scientific Research (TNO) Ref2 data set or data gap-filled by CEIP should be used for the data set for EMEP models.

78. The European Commission had sponsored the travel/accommodation for seven experts from the Western Balkans and Türkiye via one of their neighborhood programmes, resulting in a geographically more balanced Expert Review Team.

79. The Steering Body and the Working Group:

(a) Welcomed the list of priorities for future in-depth reviews;

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<sup>30</sup> Bradley Matthews and Robert Wankmueller, CEIP Technical Report No. 02/2021 (Vienna, Environment Agency Austria, 2021).

(b) Recommended that the next year stage 3 review focus on emissions from agriculture with a special emphasis on NH<sub>3</sub>, NMVOC and NO<sub>x</sub> emissions, including gridded data;

(c) Urged Parties to provide without delay “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;

(d) 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) black carbon inventories;

(e) Strongly encouraged Parties of 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 additional experts for the roster of review experts;

(f) Noted with appreciation the support of Parties that had provided experts for reviews and the extensive support provided by the European Commission and the European Environment Agency to those activities, including the update of the EMEP/EEA Guidebook.

## **B. Measurements and modelling**

80. The Co-Chair of the Task Force on Measurement and Modelling (TFMM) reported the progress in implementing the 2022–2023 workplan, including highlights of the twenty-third annual meeting (online, 3–5 May 2022). A field campaign devoted to improving understanding of ozone episodes and reinforcing volatile organic compound measurement at EMEP sites had been held in the summer of 2022; preliminary results would be analysed in the autumn in order to decide on a potential follow-up phase in 2023. New developments were presented for the multi-model intercomparison of benzo(a)pyrene (BaP) based on the MSC-East EMEP model and several other models developed by States Parties. The Task Force was also collaborating with the Copernicus Atmosphere Monitoring Service to assess the sensitivity of global and regional models to future projections of main pollutant and of methane, with a particular focus on future ozone and PM.

81. The Head of the Meteorological Synthesizing Centre-West (MSC-West) gave an overview of progress of work of the MSC-West during 2021–2022. She presented highlights from: (a) a report describing air pollution in Europe in 2020 entitled *Transboundary air pollution by sulfur, nitrogen, ozone and particulate matter in 2020* (including source receptor matrixes and country reports) that had been published recently;<sup>31</sup> (b) a project on condensables organics (partly financed by the Nordic Council of Ministers); (c) an assessment relevant for the Gothenburg Protocol review; (d) a project looking at the transport distance of reduced nitrogen; and (e) the EMEP trend interface.<sup>32</sup>

82. A representative of MSC-East presented the outcome of the work carried out by the Centre, CCC and CEIP on heavy metals and POPs at the national, regional, and global scales, with the focus on country-scale studies, scientific cooperation on mercury pollution assessment and research activities on polycyclic aromatic hydrocarbons (PAHs) as a part of the EuroDelta-Carb project. He summarized the main results of a country-scale study of mercury pollution in Norway performed in cooperation with national experts and TFMM. He also highlighted ongoing and planned cooperative efforts on mercury pollution assessment within TFHTAP and other scientific communities. Additionally, a pilot study of heavy metal pollution from wildfires was described. Particular attention was paid to cooperation with the

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<sup>31</sup> H. Klein and others, MSC\_W Data Note No. 1/2022: Individual Country Reports.

<sup>32</sup> See <https://aeroyal.met.no/evaluation.php?project=emep-trends>.

effect community on the evaluation of long-term pollution trends involving a variety of modelling and measurement data, and to collaboration with the marine conventions (the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), HELCOM) on assessment of heavy metal pollution of the marine environment. He also announced that an open-source version of the Global EMEP Multimedia Modelling System operational model for heavy metals and POPs had been released into the public domain.

83. Another presentation from MSC-East focused on research activities on POPs, with emphasis to various aspects of PAH pollution assessment. In particular, a multi-model study of B(a)P pollution levels in Europe, performed by MSC-East and several modelling groups of EMEP countries in the framework of the TFMM/EuroDelta-Carb intercomparison, had demonstrated a generally reasonable level of agreement with measurements. At the same time, differences between the modelling results indicated the need for further analysis in order to harmonize and improve the modelling approach for B(a)P. National scale PAH pollution assessment for Poland had shown that an updated national PAH emission inventory allowed the improvement of pollution assessment for benzo(b)fluoranthene (B(b)F) and benzo(k)fluoranthene (B(k)F), while no improvements had been obtained for indeno(123-cd)pyrene. A pilot modelling study using expert estimates of B(a)P emissions from wildfires had demonstrated the importance of that emission source, which could noticeably contribute to pollution levels and had adverse effects for human health. Furthermore, in the framework of cooperation with ICP Vegetation, an evaluation of long-term changes of POP and chemicals of emerging concern (CEC) pollution levels had been performed showing the importance of combined analysis of data from moss surveys, as well as from air pollution monitoring and modelling. Lastly, cooperative activities with TFHTAP on the assessment of global scale POP pollution were described and preparatory work, as well as pilot modelling studies on CECs, was outlined.

84. A representative of CCC presented the status of implementation of the EMEP monitoring strategy and gave an overview of main activities in 2022. The timeliness and quality in data reporting had improved due to better tools for reporting. Consequently, EMEP observations had become available earlier. An intensive measurement period on ozone episodes including observations of precursors had been conducted during a heatwave in the summer of 2022, and efforts would be made to repeat the campaign next summer. Results from the intensive measurement period on POPs in 2016 were presented, as well as results from the intensive measurement period on source apportionment of carbonaceous aerosols during the winter of 2017/18.

85. The Steering Body and the Working Group:

- (a) Noted the progress in implementation of the 2022–2023 workplan;
- (b) Noted with appreciation the support of the Nordic Council of Ministers to the project on condensables;
- (c) Acknowledged the results of the project on condensable organic PM and encouraged further investigations, especially on the model parametrizations and emission inventories and comparisons with observations;
- (d) Recommended further investigating the results on ozone and projections and future trends, possibly including climate change and areas outside European region;
- (e) Recommended providing model results (expected in 2–3 weeks) on ozone in future scenarios, including effects from outside Europe, to ICP Vegetation for use in ex post analysis;

- (f) Encouraged Parties and experts to review the trends analysis web site and to provide feedback to MSC-West;<sup>33</sup>
- (g) Requested the Extended Bureaux to discuss the priorities with regard to future work on POPs and heavy metals, and more generally CECs, at their next meeting in 2023;
- (h) Encouraged accounting for activities of the European Chemicals Agency and the European Union Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation<sup>34</sup> to develop a strategy on CECs;
- (i) Recommended to CCC to repeat the intensive measurement campaigns for POPs under EMEP in 2026, potentially adding one PAS with other adsorbent to include CECs;
- (j) Recommended to CCC to consider repeating the campaign on ozone episodes during summer 2023.

### C. Integrated assessment modelling

86. A representative of TFIAM reported on its activities, including the results of its fifty-first meeting (online, 6–8 April 2022). Implementation of the workplan was progressing as planned, with the major focus on the drafting of the report of the Gothenburg Protocol review group and the preparation of a guidance document demonstrating the costs of inaction on air pollution. The fifty-first meeting of TFIAM had concluded that most of the questions asked by the Gothenburg Protocol review group could be answered, but also recommended that further sensitivity analyses be carried out to ensure robustness of policy advice from models. The forthcoming workplan items in focus for 2022–2023 were to arrange the fifty-second meeting of TFIAM and the fourth and fifth sessions of the Expert Panel on Clean Air in Cities, initiate discussions on scenarios, and finalize a guidance document on non-technical and structural measures.

87. A representative of CIAM reported on the progress of work in 2021/22, including on the update and further development of its Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS) modelling tool (jointly with MSC-West), implementation of the new critical load database (with the support of CCE), consideration of the condensable PM fraction in GAINS, source apportionment in cities, and more. The updated modelling framework had been applied to develop new emission scenarios for the whole United Nations Economic Commission for Europe region (ECE) and to perform a preliminary impact assessment in support and response to the questions for the Gothenburg Protocol review. The current legislation scenario indicated continued reductions of air pollutant emissions for all Parties, with the exception of NH<sub>3</sub>, which was expected to decline only slightly or to continue increasing in the next decades, jeopardizing compliance with the Gothenburg Protocol obligations, specifically widespread exceedance of critical loads for eutrophication. According to CIAM, current emission trends would leave the majority of the population of the ECE region exposed to levels of PM<sub>2.5</sub> exceeding the WHO global AQGs. However, CIAM had identified further mitigation potential, varying across the Parties, which would allow for the level of ecosystem protection to be significantly increased and the reduction of

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<sup>33</sup> See <https://aeroyal.met.no/evaluation.php?project=emep-trends>.

<sup>34</sup> Consolidated text: Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, *Official Journal of the European Union*, L 396 (2006), p. 1.

exposure to PM<sub>2.5</sub>. The GAINS model had been extended to include capacity to analyse source attribution of air pollution in cities, model mercury sources and mitigation opportunities at the global level, and representation of the whole Eastern Europe, the Caucasus and Central Asia and the Balkans region at the country level. CIAM had reported about the synergies with several European Union-funded projects where both the European Union and the Air Convention benefited from joint and harmonized activities. CIAM announced that the first GAINS model user community meeting would be held in November 2022. CIAM work in 2023 would focus on the development of scenarios assessing the feasibility of achieving the WHO AQGs and the potential revision of the Gothenburg Protocol, the updated global Hg inventory and projections in GAINS and collaboration with TFHTAP, TFTEI and the Forum for International Cooperation on Air Pollution (FICAP), among others.

88. The Steering Body and the Working Group:

- (a) Noted the progress in implementation of the 2022–2023 workplan;
- (b) Acknowledged the scenario assessment work performed by MSC-West, CCE and ICPs for the Gothenburg Protocol review;
- (c) Acknowledged the updates to the GAINS model and the large number of results related to the scenarios developed to support the current review of the Gothenburg Protocol, including specific analysis for subregions;
- (d) Stressed the need to make national scenario data in the GAINS model publicly available to enable analysis by national experts;
- (e) Welcomed the new work on mercury in cooperation with TFHTAP.

#### **D. Hemispheric transport of air pollution**

89. The Co-Chair of the Task Force on Hemispheric Transport of Air Pollution (TFHTAP) provided an overview of the Task Force's progress on elements of the 2022–2023 workplan, including outcomes of its online meetings on 17–19 and 25 May 2022 and ongoing work on global emissions inventory development, global and regional model evaluation and intercomparison and global scenario assessment.

90. The Steering Body and the Working Group:

- (a) Welcomed continued progress on the workplan elements related to the Gothenburg Protocol, 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 completion and release of the updated global emissions mosaic inventory for 2000–2018;
- (c) Welcomed the ongoing work to coordinate model evaluation and intercomparison efforts for mercury with the Minamata Convention and to organize a multi-pollutant intercomparison, including POPs, focused on fires.

#### **E. Condensables in emission inventories and modelling**

91. The EMEP Chair provided a summary of the work by EMEP and EMEP groups on condensables since the last EMEP Steering Body/Working Group on Effects joint session.

That included the establishment of an ad hoc group of experts,<sup>35</sup> as requested by the Executive Body, to investigate how the “science” road map could be implemented to improve the quality of emission inventories and modelling results. Also, a workshop on reporting of condensables under the Convention had been organized with the support of the European Commission (Brussels, 26–27 April 2022). Work on condensables would continue in line with the stepwise approach proposed in the “science” road map in 2020.

92. The Steering Body and the Working Group:

(a) Agreed to present the synthesis of work as presented during the session to the Executive Body;

(b) Recommended organizing a meeting between the centres and national experts to explain the methodological approaches and the assumptions of the alternative emission inventory used for modelling purposes.

## **XI. Elections of officers**

93. In accordance with the rules of procedure for the sessions of the Executive Body of the Convention,<sup>36</sup> applying *mutatis mutandis* to its subsidiary body:

(a) The EMEP Steering Body re-elected Mr. Mike Holland (United Kingdom of Great Britain and Northern Ireland), Mr. Xavier Querol (Spain) and Ms. Joanna Struzewska (Poland) as Vice-Chairs for a term of two years. It elected Mr. Robert Pinder (United States of America) as a Vice-Chair for a first term of two years.

(b) The Working Group on Effects re-elected Ms. Sabine Augustin (Switzerland), Mr. Jesper Bak (Denmark) and Ms. Alessandra De Marco (Italy) as Vice-Chairs for a term of two years.

94. In the absence of nominations for Chairs, the EMEP Steering Body and the Working Group on Effects requested the current Chairs Ms. Rouíl (France) and Ms. Rábago (Spain), to remain in office for another year, until elections could be held at the ninth joint session in September 2023.

95. The Steering Body and the Working Group encouraged Parties to submit nominations for candidates for the positions of Chairs in time for the ninth joint session in 2023.

## **XII. Other business**

96. The Working Group on Effects and the EMEP Steering Body expressed gratitude and noted with appreciation the significant support provided by Ms. Schuetze and Mr. Dirnböck, who had served as Vice-Chairs for the past terms.

## **XIII. Adoption of the draft report of the eighth joint session**

97. The Steering Body and the Working Group:

(a) Reviewed and adopted the draft report (a) containing the decisions taken during the session;

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<sup>35</sup> ECE/EB.AIR/148, para. 10.

<sup>36</sup> Available at [https://unece.org/DAM/env/documents/2016/AIR/Decision2010\\_9and2013\\_1.pdf](https://unece.org/DAM/env/documents/2016/AIR/Decision2010_9and2013_1.pdf).

- (b) Entrusted the secretariat with finalizing the report of the eighth joint session.
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