30 July 2024

Original: English

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

Tenth joint session
Geneva, 9–13 September 2024
Item 5(b) of the provisional agenda
**Progress in activities of the Cooperative Programme for Monitoring and Evaluation of the Long-range
Transmission of Air Pollutants in Europe in 2024 and future work: measurements and modelling**

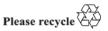## Measurements and modelling

Report of the Task Force on Measurements and Modelling on its twenty-fifth meeting

Summary

The present document contains the annual report of the Task Force on Measurements and Modelling under the Steering Body to the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe, in accordance with the 2024–2025 workplan for the implementation of the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/154/Add.1), and in line with the revised mandate of the Task Force (Executive Body decision 2019/8).[a] The present report summarizes the discussion at and the outcomes of the Task Force's twenty-fifth meeting (Warsaw, 6-7 May 2024).

The Task Force on Measurements and Modelling (TFMM) has outlined its activities for 2024 and 2025 and identified potential items for the biannual work plan for 2026-2027. A focus is on hydrocarbon measurements and their influence on ozone episodes and secondary organic aerosols. A new measurement campaign coordinated by CCC will be organised in September 2024. A modelling exercise for the previous intensive measurement period in July 2022 will analyse how anthropogenic and biogenic hydrocarbons contribute to these formations. The estimation of VOC emissions and temporal profiles remains a challenge. In the context of secondary aerosols, the identification and quantification of primary biogenic VOC and NH3 contribution to particulate matter is critical. Accurate simulation of aerosol processes is essential for assessing the effectiveness of emission reduction scenarios. TFMM expands its tasks to include the development of best practices for using modelling results in health assessments, with a pilot analysis of BaP health-related effects scheduled for 2025. Engagement of Balkan countries through national case studies is foreseen.

Proliferation of low-cost sensors for air quality monitoring presents opportunities and challenges in validation and network integration. A new measurement need for ultra-fine particles (UFP), black carbon (BC), and ammonia (NH_3) require updated methodologies. Given the significance of the issue and the evolving state of knowledge, TFMM will maintain interest in monitoring Chemicals of Emerging Concern as well as the use of low-cost sensors.

I. Introduction

1. The present report contains the outcomes of the twenty-fifth meeting of the Task Force on Measurements and Modelling (TFMM, Warsaw, Poland, and also some remote participation, 6–7 May 2024), including the presentation of activities undertaken since its previous meeting (Warsaw, Poland – hybrid meeting, 10–12 May 2023). It describes progress on the implementation of the monitoring strategy of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) for the period 2020–2029 (Executive Body decision 2019/1) and on the development of modelling tools and specific ongoing assessments, as well as current and potential collaborative activities with other bodies of the Convention on Long-range Transboundary Air Pollution.

2. In all, 147 experts from the following Parties to the Convention attended the meeting: Belgium, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, the Netherlands, Norway, Poland, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom of Great Britain and Northern Ireland. Also present were representatives of the Chemical Coordinating Centre (CCC); the Meteorological Synthesizing Centre-East (MSC-East); the Meteorological Synthesizing Centre-West (MSC-West); the Centre for Integrated Assessment Modelling; the EMEP Steering Body; the European Chemical Industry Council (CEFIC); the European Commission; the Joint Research Centre (Ispra); the Task Force on Emission Inventories and Projections (TFEIP); the Task Force on Integrated Assessment Modelling (TFIAM); the Task Force on Hemispheric Transport of Air Pollution (TFHTAP); and the World Meteorological Organization (WMO).

3. The meeting was opened by the host institutions with opening addresses by Krystian Szczepański, Director of the Institute of Environmental Protection – National Research Institute, and Emilia Konopka-Górna on behalf of the Department of Air Protection and Climate Negotiations of the Ministry of Climate and Environment (Poland). They informed on the activities of Poland with regards to air quality and environmental protection in general and in particular support of UNFCCC and LRTAP Conventions and activities related to relevant European Directives.

4. Laurence Rouil, Chair of the EMEP Steering Body, reminded the participants of the motivation behind the establishment of TFMM and provided an overview of its past activities. Referring to the mandate, she underlined the importance of TFMM as a forum for cooperation between EMEP centres and Parties.

5. Co-chairs of TFMM - Joanna Struzewska (Poland) and Lorenzo Labrador (WMO) welcomed participants and presented the agenda of the meeting, highlighting the main areas of work.

II. Updates from the Convention and EMEP Centres

6. Hilde Fagerli from MSC-West presented on the progress of the Centre's activities in 2023 and 2024. These activities included an update on ozone reduction related activities, namely importance of European and non-European emission reduction. The impact of methane (CH_4) emissions was also discussed as CH_4 is considered for inclusion in the revised Gothenburg Protocol review. Although substantial reductions can be achieved, WHO air quality guidelines (AQG) levels will not be attained. The impact of CH_4 might grow in the future because of its projected increase. Another important research area presented by MSC-West was related to the development of local fraction methodology as an alternative source receptor technique. It was confirmed that local fraction method provides very similar results

to the classical brute-force approach. It will be investigated if local fraction methodology could be implemented in GAINS.

7.	Oleg Travnikov from MSC-East presented ongoing research and development activities of the Centre after it relocated to the Josef Stefan Institute in Ljubljana, Slovenia. The results of the preparatory work for EMEP operational modelling of HMs and POPs are very promising based on the preliminary simulations conducted for 2022. Ongoing and planned updates of the GELOMS model include further development of the chemical scheme for Hg and air-surface exchange fluxes, as well as POP multi-media processes. Cooperation with TFHTAP and the Minamata Convention within the scope of Multi-Compartment Hg Modelling and Analysis Project (MCHgMAP) was also mentioned. MSC-East confirmed that country case studies will be continued and announced a new pilot study for the Balkan countries. The preliminary program of a country-scale study of PAH pollution in Slovenia were also presented. MSC-East expressed its interest in contributing to cooperative activities on contaminants of emerging concerns.

8.	Tim Butler from TFHTAP provided an overview of the implementation of HTAP3-OPNS (Multi-model simulation of Ozone, Particles, and deposition of N and S). TFMM modelling experts were invited to take part in this initiative to address global-to-regional downscaling issues. Apart from CLE and MTFR scenarios developed by IIASA/CIAM, TF HTAP proposed a new scenario which is a combination of CLE (methane) and MTFR (other pollutants). The results of HTAP3-OPNS aims to support the revision of the Gothenburg Protocol.

9.	Lorenzo Labrador of WMO presented the Implementation Plan of the Global Atmosphere Watch Programme (GAW) for the 2024-2027 period, which was approved by the WMO Congress in May 2023. He outlined the organization of the program and alignment of activities with WMO's strategic plan. This is referred to as an integrated topical value chain and it is supported by, among others, capacity development activities. He updated on the support to the environmental policy, including bulletins such as the Greenhouse Gas Bulletin and Air Quality and Climate Change Bulletin. The 2022 meeting on Carbon Dioxide, Other Greenhouse Gases and Related Measurement Techniques provided recommendations on GHG observations. The Integrated Global Greenhouse Gas Information System Initiative (IG3IS) hosted the second user summit and produced recommendations on urban GHG emissions good practices. WMO also produced, together with UNEP, the 2022 Scientific Assessment of Ozone Depletion report. The Group of Experts on the Scientific Aspects of Marine Environmental Protection's (GESAMP) Working Group 38 on the Atmospheric Inputs to the Ocean, sponsored by WMO, held a workshop on the impacts of atmospheric deposition on ocean productivity in the western Indian Ocean and linked it with the stakeholders' practices. Direct engagement with user community is an important element when providing particular scientific advice to resolve specific environmental problem on a relevant scale. The WMO representative further reflected on the activities related to establishment of the new WMO GHG monitoring infrastructure and its elements. The support to the health and ecosystem sector is provided through the publication of the annual Air Quality and Climate Bulletin and Sand and Dust Bulletin. A new working group on the linkages of air pollution, climate change and health was established. WMO hosted the integrated urban workshop across all WMO activities. Three urban reports were launched in June 2022. A new report on the use and applications of low-cost sensors to monitor air quality was published in early 2024 and TFMM participated in this work.

10.	Kjetil Torseth from CCC provided an update from the Centre. He discussed data FAIRness Principles (data should be Findable - Accessible - Interoperable - Reusable) in the context of EBAS and ACTRIS databases maintained by NILU (https://vocabulary.actris.nilu.no). Also, an update related to the monitoring of CEC (Chemicals of Emerging Concern) was provided based on the outcome from the workshop held in November 2023. It was recommended to standardize monitoring practices and filling knowledge gaps. A need for measurement campaign was formulated. Constituents discussed covered: PFAS, chlorinated paraffins, siloxanes and microplastics. Further, he reported on an intercomparison of the data and metadata from stations that reported to both EBAS and EEA. Stations available only in EBAS that could be potentially included in EEA and CAMS analysis were identified. He concluded with a list of CCC reports published in 2023.

11.   Kjetil Torseth from CCC also discussed the changes in the revised Directive on Ambient Air Quality and Cleaner Air for Europe, adopted in April 2024, and the relation of these changes to the EMEP Monitoring Strategy. He postulated additional monitoring of background concentrations and deposition of pollutants and an explicit indication of monitoring of UFP, black carbon, ammonia and oxidative potential of particulate matter. The Article 10 on Monitoring supersites was recalled in the context of postulated coordination with EMEP and ACTRIS monitoring strategy. Monitoring of ozone precursor substances was also mentioned. In conclusion, the CCC representative stated that EMEP monitoring requirements fulfil the obligation for supersites and only oxidative capacity of particulate matter is not included in the protocol.

12.   Chris Dore, a co-chair of the Task Force on Emission Inventories and Projections, presented the key activities of the task force relevant for the measurement and modelling communities. He informed about progress on the next update of the joint EMEP/EEA air pollutant emission inventory guidebook. He focussed on the cross-cutting issues including better availability of datasets from satellite measurement. He remarked that additional funding is needed to continue with the update of the guidebook. He went on to elaborate on other relevant task force workplan items: guidance on reporting condensable particle matter, improved data for modellers: updated EMEP gridded emissions and consolidation of intermediate and semi-volatile condensable PM emissions in models.

13.   Co-chairs of TFMM - Joanna Struzewska (Poland) and Lorenzo Labrador (WMO) presented and overview of the workplan. It was underlined that TFMM remains an open forum inviting research groups willing to contribute to coordinated Task Force activities. The relevance of TFMM outcome for the Gothenburg Protocol review was underlined especially in the context of evaluation the reliability of modelling tools for accurate representation of ozone and aerosol formation processes. To achieve this, TFMM will identify knowledge gaps and model deficiencies in terms of the role of VOCs in high ozone pollution episodes and secondary organic aerosol formation. A dedicated modelling exercise will be undertaken as a follow-up of the Intensive Observation Period in July 2022. Based on the models' ability to reproduce aerosol chemical composition, TFMM will provide the feedback on emissions reporting needs in reference to black carbon, organic carbon, detailed VOC profiles and a methodology for the inclusion of condensable species in the inventories. In addition, TFMM will couple modelling results with health assessment tools to establish best practices for integrating the assessment process. On the measurements side, TFMM will investigate the VOCs concentration variability by organising the campaign in September 2024 and will continue the revision of monitoring techniques of Chemicals of Emerging Concern.

III.   Thematic Session: Volatile Organic Compounds impact on ozone

14.   Wenche Aas from CCC presented an update of the results of the analysis from the O_3/VOC/SOA EMEP Intensive Measurement Period (IMP) of July 2022. Considering the length of the IMP and the dynamic situation, the measurement results do not allow for general conclusions. Analysis of VOC distribution at selected sites showed that VOC composition was dominated by "other VOCs" and C2-C5. Up to 80 per cent of organic aerosols was attributed to SOA, which underlines the importance of correct representation of such processes in the models. A follow-up campaign is planned for September 2024. The focus will be on VOC concentration measurements near emission sources, including industrial and urban sites. Accounting for the varying lifetimes and evaporation potential of VOCs, a high temporal resolution will be assured.

15.   Therese Salameh from IMT Nord Europe discussed the question of whether traffic is still an important source of volatile organic compounds in European urban areas. For this purpose, a VOC source apportionment study at two European sites – Marseille, France and Zurich, Switzerland, was undertaken. The study compared VOC concentrations, seasonal variability, major chemical families, and on potential major sources at both sites. Very similar profiles of measured NMHC families were found for each summer and winter season at both sites. Likewise, it was found that oxygenated VOCs are an important part of the total VOC concentration in the urban atmosphere at both sites. Eight different sources of VOCs were

identified in Marseille and six in Zurich over the four seasons. It was concluded that traffic (exhaust and fuel evaporation) is still an important source but there are new emerging sources (solvent use) when additional tracers (OVOC and biogenic) are considered.

16.   Yao Ge from MSC-West/University of Cambridge presented the evaluation of modelled vs. observed NMVOC at sixteen EMEP sites in Western and Northern Europe. It was confirmed by the model that methane has the highest annual concentrations. I-/n- butane and i-/n- pentane ratios were investigated to provide feedback on emission accuracy. In both cases modelled ratios are much smaller than the observed ratios, and the discrepancies could be most probably attributed to the uncertainty in emissions' estimates in the solvent, transport and agriculture sectors.

17.   Robert Wegener from Forschungszentrum Jülich gave a presentation on ozone production deduced from offline precursor measurements in Europe. Online data of NO_2, together with offline data of VOCs from a combination of canister, Tenax tubes and OVOC cartridge measurements, were acquired across a number of European sites in the framework of the EMEP 2022 intensive measurements campaign. Local ozone production was determined at EMEP sites, where it was found that ozone production is NO_x limited. In the city of Zurich, it was found, however, that NO_x concentration was optimal for ozone production. Measurements there showed a trend towards higher ozone production rates (similar to observations in China). It was also found that using NO_2 data from Molybdenum converters leads to an over- or underestimation of ozone production, depending on the respective VOC/NO_x ratio.

18.   TFMM's co-chair Joanna Struzewska, presented the concept of the modelling exercise planned as a follow-up of IMP conducted in July 2022. She defined four aspects in which models will be tested: ability to reproduce ozone concentrations, ability to reproduce VOC concentrations, the role of biogenic emissions and chemical regimes indices evolution. After presenting preliminary results, she proposed a set of simulations and output specification. It was assumed that the modelling groups will use their best models setup and that the only framed input parameter is the EMEP emission inventory for the year 2022. The technical specification of the modelling exercise will be sent by the end of June 2024.

19.   The session was concluded by a general discussion highlighting the need to consolidate the analysis and initiate a modelling exercise to better answer policy questions such as (i) do biogenic emissions dominate ozone formation processes?; (ii) what is the scope of mitigation of anthropogenic VOCs?; (iii) what is the relative importance of VOC and methane?; (iv) how can monitoring data be used to not only understand formation of secondary pollutants but also track sources and validate emission inventories?

IV.   Thematic Session: Ozone trends and source apportionment

20.   Xavier Querol from the Institute of Environmental Assessment and Water Research (IDAEA-CSIC) presented on the outcome from O_3 Spanish National Plan. He provided the interpretation of ozone trends in the period 2008-2023, including the Covid-19 lockdown periods and phenomenology of episodes in hotspot regions. For regionalization of ozone episodes, information extracted from emission inventories and satellite NO_2 column observations were used. Further steps will involve VOC campaigns at traffic sites in different cities and sensitivity analysis of episodes.

21.   Oriol Jorba from the Barcelona Supercomputing Center continued on the topic of the Spanish Ozone Mitigation Plan, providing and update on modelling activities. Based on modelling results it was found that ozone concentrations in Spain are strongly driven by road transport and shipping emissions. Systematic underestimation was found in simulated NO_2. Evaluation of NMVOC showed underestimation at traffic and industrial stations while concentrations at background stations were slightly overestimated. The Global Harmonised Observations in space and Time (GHOST) dataset was presented as a source of data for air quality analysis.

22.   Martin Schultz from Forschungzentrum Julich presented the TOAR database and the scope of TOAR-II initiative. He provided an overview of the on-line data query and

visualisation tool. The TOAR database could serve as an important source of surface ozone data.

23.   TFMM's co-Chair Joanna Strużewska summarised several new challenges in the field of air quality and atmospheric research based on the outcome from the first day. Addressing these challenges will require coordinated efforts, advanced research, and innovative approaches within the TFMM framework. Participants were asked to take part in the survey on the ideas for the next bi-annual plan. Many experts indicated particular interest in natural emission sources in the contexts of transboundary transport and particulate matter chemical composition. Ozone and VOC remains also as very important topics.

V.   Thematic Session: General country update

24.   Ari Karpinnen from FMI presented various current activities at the Finnish Environmental Institute, including operational air quality modelling service, urban scale modelling (also machine learning assisted), global modelling of ship emissions to air, water, noise (a unique group) and an innovative study of flows inside the human lung.

25.   Ondřej Vlček from CHMI presented an updated on the status of air quality in Czechia and the use of modelling for air quality mapping and planning. The planning includes regular update of air quality improvement plans. For the update, emission scenarios agreed with Ministry of Environment are evaluated with the CAMx model. The reference and scenario runs are compared with the same meteorology.

26.   Marta Garcia Vivanco from the Center for Energy, Environmental and Technological Research (CIEMAT) presented the results of a case study on the influence of the modelling methodology on the assessment of impacts and air quality compliance with the European legislation (Ambient Air Quality Directive). Assessing non-compliance with models proves complicated due to various factors that affect model application, multiple methods for model correction, difficulty in assignment of an uncompliant cell to an air quality zone and consideration of different meteorological conditions.

27.   Pawel Durka from the Institute of Environmental Protection – National Research Institute (IEP-NRI) provided details of a recent study on the air quality modelling for the 5-year assessment (2019-2023). The study showed descending trends in concentrations measured and modelled (mainly PM and BaP) but a slight increase for ozone. Hot spots were identified in Southern Poland based both on maps and measurements. There was generally good agreement between measurements and modelled concentrations.

VI.   Thematic Session: Low-cost sensors

28.   Sara Basart from WMO provided an overview of the low-cost-sensors (LCS) report produced by that organization in 2020. The report provided an overview of the state of the art regarding the reliability and reproducibility of different sensors used for the measurements of atmospheric composition along with the key analytical principles as well as lessons-learned about low-cost sensors from both laboratory studies and real-world tests. The document considers specifically sensors designed for the measurements of atmospheric composition at ambient concentrations of constituents including NO, NO_2, ozone, CO, SO_2, and an operational metric defined as 'total VOC', the long-lived greenhouse gases CO_2 and CH_4, and airborne particulate matter in various size classes i.e., PM_1, $PM_{2.5}$ and PM_{10}. Amongst its conclusions, the report remarked that more information on sensor lifetimes and degradation over extended periods of time is needed. Most research evaluations of sensor performance are limited to weeks or months and there is a lack of information on changes over annual timescales and longer. The WMO is planning on producing updates of this report as the LCS technology evolves.

29.   Janice Scheffler from the UK's Centre for Hydrology and Ecology gave a presentation on the local physical chemistry statements for low-cost sensors' added value. A local Physical Chemistry statement (LPCS) was developed that uses κ-Köhler theory with a hygroscopicity parameter to calculate diameter growth factors for chemicals species depending on relative

humidity. This is an application for using modelled EMEP4UK data to compare against measured air PM sensor at a supersite in Manchester, UK. Given $PM_{2.5}$ chemical composition from global EMEP run, the LPCS may be a useful tool to non-specialist sensor users.

30.   Isobel Moore from the UK's Department of Environment, Food and Rural Affairs (DEFRA) provided an overview of the differing roles of low-cost sensors in English policy development, in particular regarding the 2019 Clean Air Strategy, 2021 Environment Act and the 2023 Environmental Targets Regulations, the latter setting new fine particulate matter targets. The new targets call for the addition of 100+ new additional $PM_{2.5}$ monitors to ensure representation of the exposure of the nation as a whole. A process of comparing performance of instruments chosen for a network with that of the EU Reference Method, known as "particulate matter equivalence", and which enables near-real-time monitoring, is being considered. This includes the instigation of a programme of work looking at instrument performance compared to the European Reference Method and establishing, in addition to the current permanent ongoing equivalence sites, an additional 7 temporary sites. This will allow the identification of any improvements that could help future iterations of the CEN Standard and the implications of falling concentrations on the effectiveness of the mathematics on which equivalence is assessed and the effectiveness of instrument performance.

31.   Joost Wesseling from RIVM provided an overview of the developments around low-cost sensors in FAIRMODE's Working Group 6. Low-cost sensor activities in FAIRMODE include a recent benchmark of the calibration method as well as an ongoing benchmark of data fusion methods using data from low-cost sensors. These activities resulted in an outliers' detection methodology based on lowest/highest sensors and an estimation of a local correction factor and interpolation correction field for sensors in the vicinity of reference stations. It was concluded that, based on these experiences, sufficiently realistic synthetic real concentrations and synthetic sensor data can be constructed and that the algorithms can substantially correct the influence of environmental conditions on the performance of the SDS011 $PM_{2.5}$ sensors used. These sensors, however, have a large random uncertainty that cannot be corrected by network calibration, which limits their individual use.

VII.   Thematic Session: PM composition

32.   Gunnar Lange from MSC-West informed about a EMEP modelling of primary biological aerosol particles (PBAP) that include fungal spores, bacteria, viruses, plankton, pollen and plant debris. According to available measurements, these biological aerosols may account for up to 20 per cent of PM_{10}. He elaborated on the parameterization of fungal spore number flux in the EMEP model and the comparison of model results with measured values at five measurement stations. There was excellent agreement in central France (Andra, Grenoble) but less pronounced seasonal variations in the South (Marseille). Fungal parameterization significantly overestimated Norwegian concentrations (Birkeness, Zeppelin). Coarse organic carbon was decently correlated but not organic carbon. Including fungal spores improved bias and temporal correlations of PM_{10} but slightly deteriorated spatial correlation.

33.   Xavier Querol from IDEA-CSIC gave a presentation on urban ultrafine particles in Europe in the framework of RI-URBANS. Data was compiled from a series of urban, suburban and rural sites, yielding a total of 29 datasets. Average daily patterns of nucleation, Aitken and accumulation sizes, as well as the ultra-fine particles (UFP) and black carbon concentrations, together with daily, weekly and seasonal patterns, were derived for each site. UFP source apportionment was derived using receptor modelling. A trend analysis for the 2009-2019 period was presented. Concentrations of lung-deposited surface area was also determined. It was concluded that comparing particle number concentrations for sizes smaller than 25 nm was difficult due to the different size detection limits and measurement errors. Likewise, improvements in the quality of measurements of particles smaller than 20 nm are urgently needed in an important proportion of sites. It was also noted that the proportions of Nucleation/Aitken/Accumulation, seasonality and daily patterns vary widely, while seasonal patterns may completely differ. Road traffic contributions reach 70-80 per cent in most cases, followed by photo-nucleation (in a proportion of cities) and domestic combustion (for another

proportion of cities). There is a clear downward trend for Aitken and Accumulation modes. This trend is less clear for nucleation. There is also a clear effect of the EURO 5&6 DPFs and road traffic measures. Epidemiology studies for short-term effects are being currently carried out.

34.   Ågot Watne from the IVL Swedish Environmental Research Institute presented a project on modelling sub-micron secondary aerosol formation with the ADCHEM Cluster modelling system. The system can be used to quantify processes and sources of ultrafine particles in Europe. The current model version most likely underestimates the anthropogenic secondary organic aerosol formation. The study showed the need for more long-term measurements of aerosol precursors.

35.   Florian Couvidat from the French National Institute for Industrial Environment and Risks (Ineris) informed about the study on the evaluation of organic aerosol in chemical transport models (CTMs) by comparison with positive matrix factorization (PMF) outputs throughout Europe. Comparing CTM with PMF results is not straightforward and not easy with a number of methodological issues. However, the comparison could help to better represent organic aerosols in CTMs and better understand the PMF results and the meaning of the different factors. Primary organic aerosol in summer could originate from sources generally not taken into account in models (cooking organic aerosol, primary sea salt). The aging mechanism is important, probably as an effect of night-time oxidation.

36.   Guido Piorovano from the Research on Energy System (RSE SpA, Milano) presented results of the LIFE REMY project on organic aerosol modelling at regional scale. The final goal of the Life Remy project is to provide recommendations and guidelines for the compilation of emission inventories with the specific aim to improve air quality model performance for assessments, source apportionment and planning. Three sensitivity tests were carried out for organic aerosol modelling in the Po Valley in Italy. There was an overall increase in the model performance and better repartition between primary (hydrocarbon-like organic aerosol) and secondary organic aerosols.

37.   Xavier Querol from IDEA-CSIC presented a study on the links between ammonia (emissions and concentrations) and urban air quality in Europe. 69 datasets of ammonia concentrations were analyzed from Spain (36), France (15), Italy (12), the UK (5) and Finland (1). Of these, 25 were qualified as urban sites, 12 as suburban sites, 12 as traffic sites and 5 as industrial sites. Within the influence of farming hotspots, urban background, suburban and regional sites showed the largest concentrations. The study showed that in order to abate PM there was a need to decrease ammonia emissions. Measurements of ammonia concentrations are highly recommended in urban areas, but the measurements are not required by the respective new European Union Air Quality directive. Urban ammonia emission (e.g. waste management, sewage management) need to be abated. Various NH_3 farming and agricultural emission abating measures were recommended. Likewise, it was recommended that NH_3 measurements be made in urban areas (although this is not required in the new Air Quality Directives).

VIII.   Discussion on TFMM workplan implementation

38.   Marta García Vivanco from CIEMAT briefed about the BaP phase of the EURODELTA-CARB model experiment. The experiment under the leadership of Spain, aimed at better connecting to Task Force on Health in order to derive potential impacts of BaP exposure. She briefed about the intercomparison of estimates of atmospheric benzo(a)pyrene from four models in Europe and related impacts on health. Mike Holland had provided a tool for assessing BaP impacts on health. So far, the health impacts had been estimated for Poland based on concentration output from four dispersion models: EMEP, CHIMERE, MINNI and SILAM, and for the ensemble (median). The next steps would include estimations for the rest of countries within the project domain.

39.   TFMM's co-Chair Joanna Strużewska provided information on the next steps related to the organization of the modelling exercise for the IMP conducted in July 2022, BAP health exercise and the identification of knowledge gasp in the modelling of aerosols chemical

composition including secondary production. Links to an on-line surveys for groups interested in participating were provided.

40.   Joanna Strużewska, summarised the meeting. The Task Force on Measurements and Modelling faces several new challenges in the field of air quality and atmospheric research. One major challenge is the accurate estimation of Volatile Organic Compounds (VOC) emissions and their emission profiles, which are critical for understanding the formation of ozone (O_3) and secondary organic aerosols (SOA). Evaluating various emission reduction scenarios and conducting trend assessments that combine meteorological data with air quality policies are essential for effective air quality management. Additionally, identifying and quantifying new aerosol species, such as the primary biogenic contribution to PM_{10}, poses a significant challenge. The increasing use of low-cost sensors for air quality monitoring offers opportunities but also requires careful validation and integration into existing networks. New measurement requirements and needs, including ultra-fine particles (UFP), black carbon (BC), and ammonia (NH_3), necessitate updated methodologies and instrumentation. Lastly, defining the role of TFMM in assessing health effects related to air pollution is crucial for developing comprehensive strategies to protect public health.

IX.   Conclusions

41.   In the conclusion of the meeting, the Task Force decided on the common activities for 2025 and summarised potential items for the next biannual workplan covering the period 2026-2027. Actions related to expanding knowledge on VOC variability will continue. A new measurement campaign coordinated by the CCC will be organized in September 2024. Interested teams with expertise in hydrocarbon measurements are welcome to join. Concurrently, a modelling exercise will be conducted for the July 2022 intensive measurement period. TFMM aims to determine how anthropogenic and biogenic hydrocarbons influence the formation of ozone episodes and the formation of secondary organic aerosols. Proper simulation of aerosol processes, especially the formation of secondary aerosols and condensable particles, is crucial for a reliable assessment of scenario effectiveness. This topic will be initiated in 2024 and continued in subsequent years in collaboration with TFEIP. TFMM tasks will be expanded to develop best practices for using modelling results in health assessment. In 2025, a pilot analysis of BaP health-related effects will be conducted. Additionally, it will create an opportunity to engage Balkan countries through national case studies. Given the significance of the issue and the evolving state of knowledge, TFMM will maintain interest in monitoring Chemicals of Emerging Concern as well as the use of low-cost sensors.

42.   Co-chairs of the TFMM, Joanna Struzewska and Lorenzo Labrador, closed the meeting by thanking participants for joining the meeting and acknowledging the organising institution – Institute of Environmental Protection – National Research Institute and Poland for hosting the meeting.