2021-2022 WGE activities

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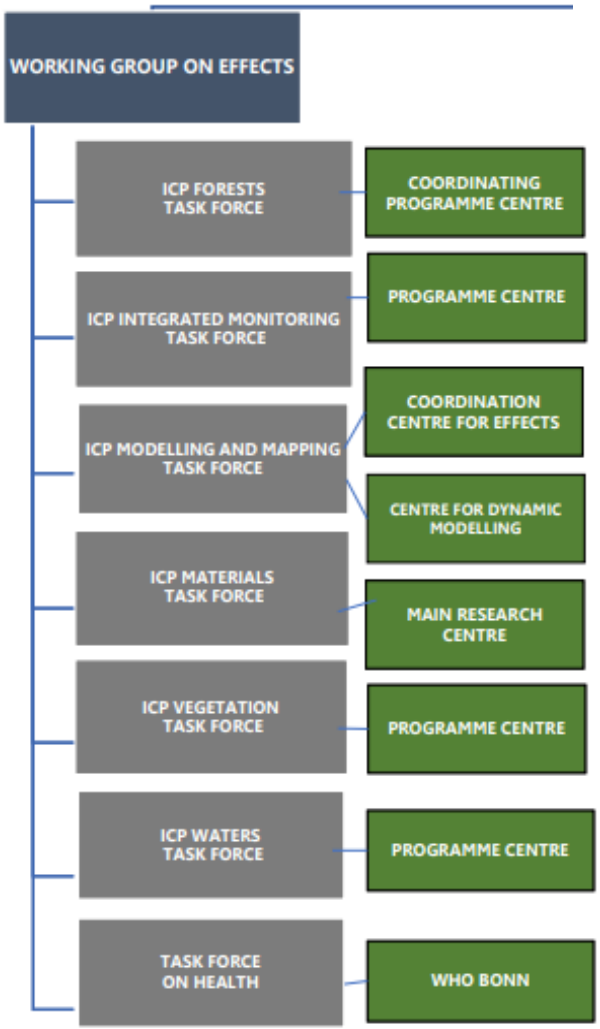
42nd session Executive Body

12 – 16 December 2022

2021-2022 Workplan: WGE activities



Outputs of the 8th joint session of EMEP-SB and WGE

- Focus on GP review
- Monitoring, Modelling and Risk Assessment Activities
- Strategy for Science
- Election of officers

TF - Health

https://unece.org/health

1.1.1.27. Consolidate existing evidence on health outcomes of exposure to air pollution

Report on methods for health risk/impact assessment of air pollution and cost-benefit analysis (update to HRAPIE project)

- Coordinated with the WHO Estimation of Morbidity from Air Pollution and its Economic
- Focus on: PM2.5, PM10, NO2, ozone and mortality, long-term effects, the WHO European Region
- New analyses and literature reviews planned
- HRAPIE-2 report expected by the end of 2023

TF - Health

1.1.1.27. Consolidate existing evidence on health outcomes of exposure to air pollution

Update of tools for quantification of the health impacts of air pollution, including links to climate change mitigation

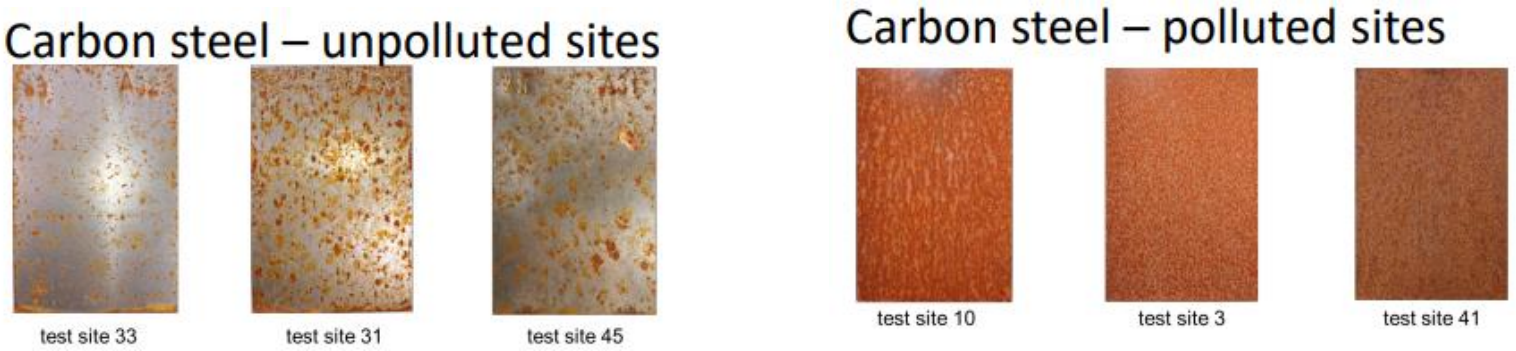
AirQ+

- Update of software parameters based on the WHO AQGs; improved Life Table module.
- New interface and name: Climate Mitigation, Air Quality and Health (CLIMAQ-H)
- Improved calculation methods of health and economic benefits of climate mitigation actions; updated default input data; greater flexibility to manipulate parameters; improved user-friendly interface
- Expected to be launched by the end of 2022

ICP - Materials

https://www.ri.se/en/icp-materials

Monitoring impacts on corrosion and soiling effects on materials



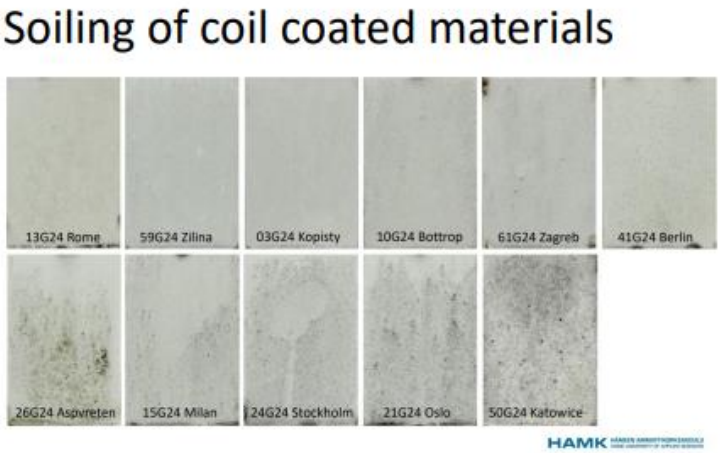
- Results of corrosion and soiling data is available for carbon steel, weathering steel, zinc, aluminium (corrosion) and modern glass, limestone, marble and coil coated materials (soiling).
- A trend analysis including the new data and environmental data will be presented in 2023.

ICP - Materials

https://www.ri.se/en/icp-materials

Monitoring impacts on corrosion and soiling effects on materials

- A new exposure has also started with the aim of comparing long term data (2021-2029) for weathering steel and carbon steel.



After 4 years of exposure, soiling is evident

- Update of the Mapping Manual with dose-response functions for corrosion (carbon steel, weathering steel, zinc, aluminium) and soiling (modern glass, limestones, marble and coil coated materials)

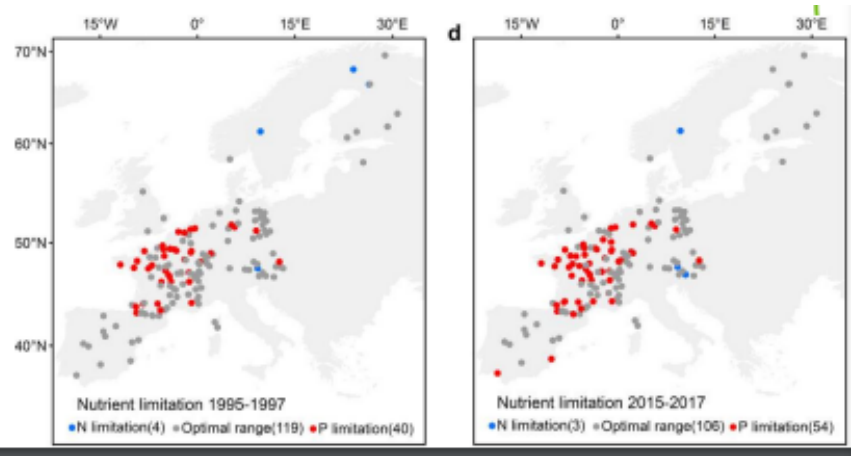
ICP - Forests

http://icp-forests.net/

N deposition and its effects on forests ecosystem functions and services

Decreasing trends in deposition since the 1990s lead to imbalances in nutrient supply to forests.

Marchetto et al, 2021



- A small proportion of forests showed a shift toward N limitation. The trend was stronger in forests with a greater decrease in N deposition (Du et al, 2022)

- It is unclear how the nutritional status of these forests will change under changing climate and N deposition

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ICP - Forests

http://icp-forests.net/

Ndep and its effects on forests ecosystem functions and services

Modelled EMEP *vs.* measured ICP Forests data

- In good agreement for sulphur and nitrate open field deposition, not for ammonium
- In good agreement with throughfall sulphur total deposition
- Large discrepancies in throughfall deposition of nitrate and ammonium

Collaboration between EMEP and ICP Forests regarding N deposition will continue

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ICP - Vegetation

https://icpvegetation.ceh.ac.uk/

Influence of CC on ozone impacts (Flux-based)

Changes in phenology -> Changes in timing of ozone accumulation

- Wheat varieties bred to maximise the shorter grain filling time may have higher stomatal uptake (more ozone sensitive?)
- For trees, increasing air temperature leads to earlier bud-break ('spring') and later leaf discolouration ('autumn') – longer growing season

Ozone Risk Assessment

Additional information and parameterization has been added to Chapter 3 of the Mapping Manual

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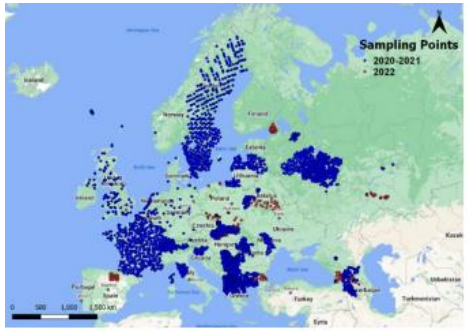
ICP - Vegetation

https://icpvegetation.ceh.ac.uk/

Moss survey

- Current survey 2020-2022: Call for data (HM, N POPs). Approximately 3500 sites sampled already
- Include pilot study on mosses as biomonitors of microplastics



Review of Critical Levels for NOx

- First workshop was held online, 24th May (37 participants from 12 countries).
- Online meeting in 2023 to update findings and plan the writing of the update
- Reporting back to the ICP Vegetation TFM in 2023

ICP - Waters

https://www.icp-waters.no/

Trends and spatial patterns in reactive N (1990-2016)

- Surface water NO3 levels and trends are mainly controlled by N deposition
- N deposition declines steeper than surface water NO3. catchments retain > 90% of N deposition
- Long term accumulation of N deposition may lead to N enrichment of soils and N saturation
- No evidence of ongoing saturation. Climate Change and ecosystem disturbance can cause higher N leaching in the future

Biological recovery of surface waters

- Trends in aquatic macroinvertebrates and links with changes in water chemical recovery
- Tentative conclusions: Biological recovery is correlated with chemical recovery
- Recovery is slower in lakes than in rivers. Report in 2022

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ICP - Integrated Monitoring

Completed relocation of ICP Programme Center from SYKE to SLU

- New ICP-IM website
- New IM Database: change of format to SQLite,
- Automated validation reports
- Updated manual

https://www.slu.se/en/icp-im

- 2021 data submission by 1st December 2022


- James Kurén Weldon, Head of Programme Centre
- Martyn Futter, senior scientist and modeller
- Karin Eklöf, heavy metal specialist in IM
- Pernilla Rönnback and Hampus Markensten, IM data base



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ICP - Integrated Monitoring

https://www.slu.se/en/icp-im

Extended IM monitoring in progress:

To include more ecosystems than forests

To facilitate multiple purposes of ecosystem reporting (NECD and habitat directive)

- Level 3: Full ICP IM site (monthly measurements, catchment as stated in the ICP IM Manual)
- Level 2: Plot scale with element budgets on other ecosystem types (monthly measurements)
- Level 1: Plot scale without element budgets. Focus on soil and vegetation

Continued work on Hg and other HM

On-going collaboration with Environment and Climate Change Canada and the University of Toronto to install passive samples for gaseous Hg

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ICP - Modelling and Mapping

https://www.umweltbundesamt.de/en/Coordination_Centre_for_Effects
https://www.ivl.se/projektwebbar/centre-for-dynamic-modelling.html

Review and revision of Empirical Critical Loads (N)

- Final report is available
- Process coordinated by CCE 2020-2022. 45 authors from ICPs (IM, M&M, W, F, Veg)
- Critical Loads ranges recommended in total 51 ecosystems. 9 new receptors. For 36 ecosystems the 2010 ranges have been adapted (of which most became lower based upon new evidence)

NH_3 Critical Levels

- Workshop hosted by CCE (March 2022): New scientific findings on the effects of ammonia on vegetation and Information exchange on ammonia monitoring (networks)
- **Ammonia critical levels from 2006 are supported by the 2022 review**

ICP – M&M Newsletter :

https://www.umweltbundesamt.de/en/news-0?parent=67248

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ICP - Modelling and Mapping

https://www.umweltbundesamt.de/en/Coordination_Centre_for_Effects
https://www.ivl.se/projektwebbar/centre-for-dynamic-modelling.html

Ongoing activities on Critical Loads

- Update the database for landuse/ landcover for UNECE region
- Continuation of cooperation in the ad-hoc group on marine protection (AMP)
- Extension of the Critical Load background database to EECCA countries

Dynamic Modelling Activities

- Modelling interactions between air pollution and climate change ->N and C: Expert workshop in 2023
- Modelling biodiversity changes to set CL for N: Draft Report in 2023
  - ✓ In collaboration with ICPs
  - ✓ Indicators & Response functions
  - ✓ Models to be used (data inputs, complexity, and applicability)

Additional WGE Activities

Common WGE portal

- 1st version developed by CDM (ICP M&M)
- Webpage centered around three themes: **Monitoring, Modelling, Impact Indicators**
- Gives information on whole WGE clustered around those themes
- Does not duplicate data, links to ICPs
- Further development in 2023

Cooperation with eLTER Research Infrastructure

- Formal letter of cooperation between WGE and eLTER
- Next workplan will include items on cooperation with eLTER RI. ICP IM requested to identify potential lines of cooperation

Election of officers

- New election of Chair in 2023

Contributions to the GP review Report

Key messages on Effects (Annex I)

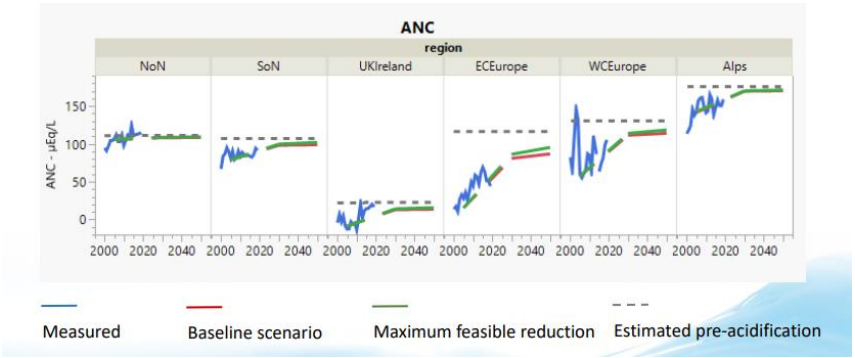
- Materials: *corrosion* decreased significantly since the early 1990s. For *soiling*, there is no decreasing trend after 1997 and larger areas in Europe are above acceptable levels.
- Risk of acidification of freshwater ecosystems: Despite large and effective efforts across Europe and North America, in some areas, air pollution still constitutes a threat
- Eutrophication is still a threat for terrestrial ecosystems
- The results confirm that emission abatement actions are having their intended effects on CL exceedances and ecosystem impacts.
- The temporal developments of the exceedances of the CLs indicated the more effective reductions of S deposition compared to N at the sites.
- Eutrophication is still a threat for terrestrial ecosystems

Contributions to the GP review: Future scenarios

Future water chemistry

Projected deposition levels for 2030 and 2050 will

- Give **further reduction in surface water acidification**
- Sulphate and nitrate concentrations will decline, and ANC will increase, but **neither will reach pre-acidification levels**
- Chemical recovery is largest where deposition has historically been highest, but this is still where levels are furthest from pre-acidification
- Climate change and interannual variability in weather will have greater effects on ANC as acid deposition declines, with unknown consequences for biological recovery



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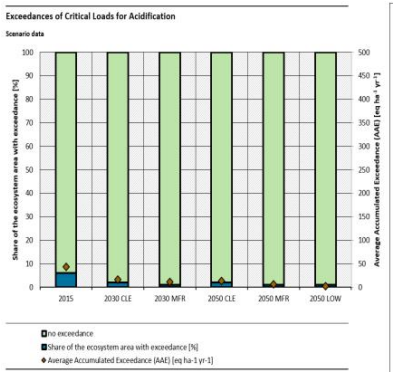
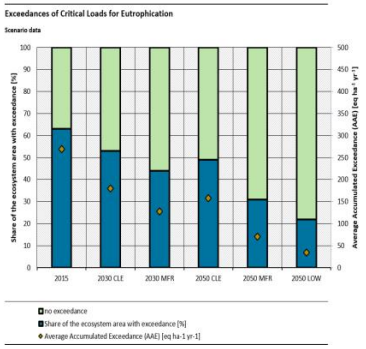
Contributions to the GP review: Future scenarios

Exceedance of CL in Ecosystems



Acidification

- **For acidification,** the emission reduction of the different scenarios will help to <u>diminish risks for ecosystems substantially</u>

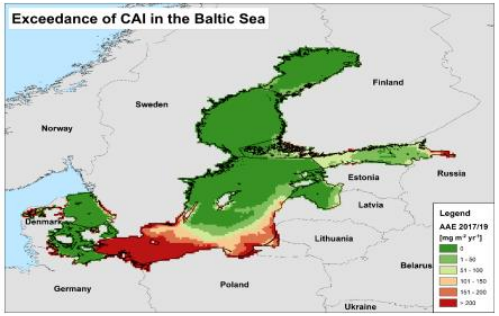


Eutrophication

- For **eutrophication** the projected emission reduction diminishes risks for ecosystems, but European ecosystems <u>would still be</u> exposed to nitrogen deposition <u>beyond Critical Loads</u>.

Exceedance of the Critical Atmospheric Input (CAI) of N to the Baltic Sea

- A cooperation of the Ad-hoc Marine Group (AMP) with the RedCore-DG of HELCOM
- Even with MFR some <u>exceedance remains in 2030</u>;
- The EMEP SB/WGE Bureaux agreed to continue the work of AMP, work will be steered by the CCE



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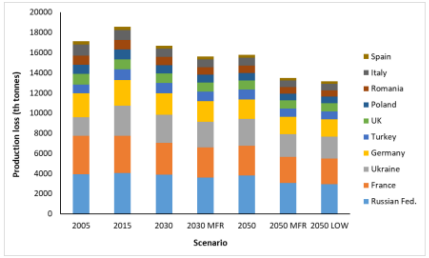
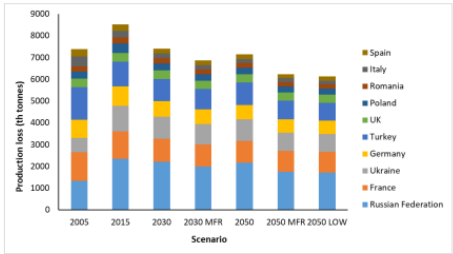
Contributions to the GP review: Future scenarios

Vegetation (Ozone)

- POD3IAM and AOT40 for **wheat**. Estimated yield losses decrease with stringent emissions scenario scenario – but significant production loss still



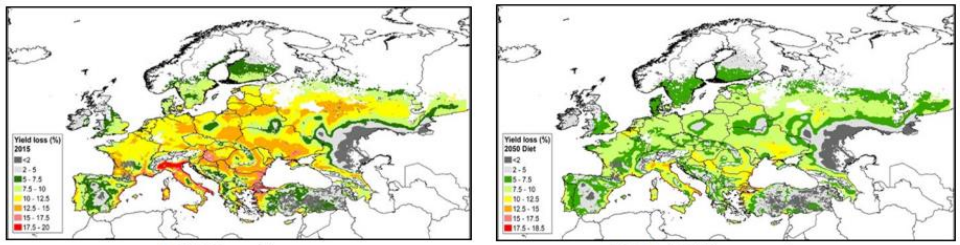
Production loss (thousand tonnes) due to ozone for the **top 10** wheat producing countries using the POD_3IAM metric.



Production loss (thousand tonnes) due to ozone for the **top 10** wheat producing countries using the AOT40 metric.

Greater losses in wheat when using the ozone flux metric (POD3IAM) compared to the AOT40 metric

- POD1IAM for deciduous forests: Biomass losses are predicted to decrease with time (2005 estimated losses of 20-25% - > in 2050 LOW scenario, many areas reduce to 15-20%)



2015 Baseline | 2050 LOW scenario

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Contributions to the GP review: Future scenarios

Materials

The analysis includes a comparison of measured data, scenario data and targets for corrosion and soiling at individual test sites.

- ✓ Results show that for some materials (i.a. carbon steel which is sensitive to SO2) 2050 targets are expected to be reached …..
- ✓ ….. while for other materials (i.a. modern glass which is sensitive to PM) 2050 targets are not expected to be reached in all areas.
- ✓ For some materials (i.a. limestone which is sensitive to several pollutants) it is necessary to improve the methodology (dose-response functions) in order to better predict corrosion data.

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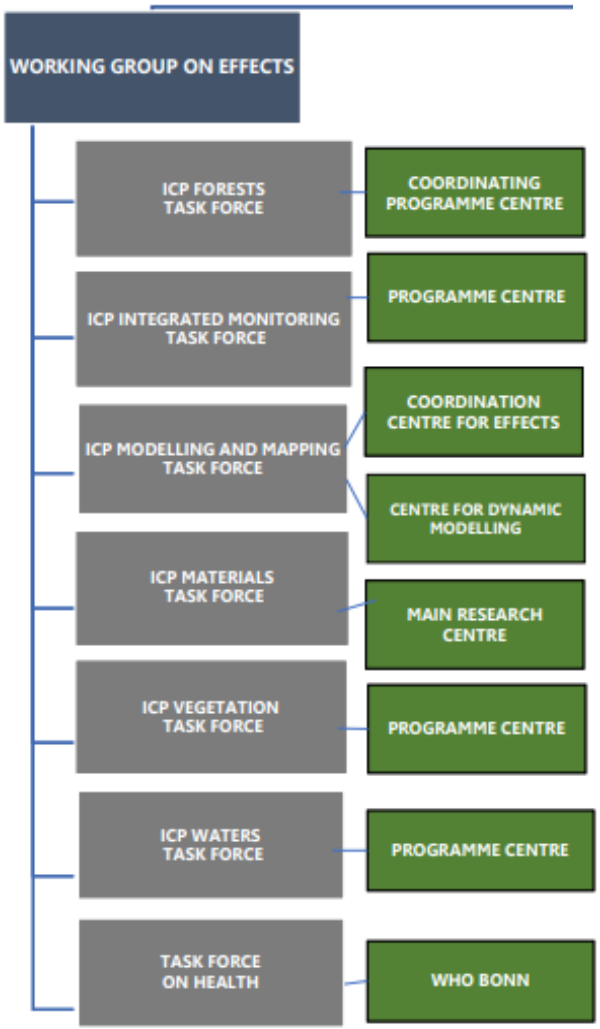
2021-2022 Workplan: WGE activities



- All activities are on-schedule
- Main focus on GP review…..
  Annex I,
  Annex II,
  complementary reports
- … While keeping scientific activities on Monitoring, Modelling and Risk Assessment

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Thank you for your attention

More information @

8th joint session of EMEP & /WGE website

https://unece.org/info/Environmental-Policy/Air-Pollution/events/360936

ICPs and TF Annual Reports (UNECE website)

ICPs and TF Technical Reports (at TF and Programme Centers websites)

UNECE Convention on Long Range Transboundary Air Pollution

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