

# **TFIAM/FAIRMODE workshop on modelling urban and regional measures for improved air quality**

15 - 16 February 2017  
Utrecht, Netherlands

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## **I. INTRODUCTION**

1. This report describes the main conclusions of the workshop on modelling urban and regional measures for improved air quality, held from the 15<sup>th</sup> to the 16<sup>th</sup> of February 2017 in Utrecht, the Netherlands. The meeting was organised by TFIAM, the Task Force on Integrated Assessment Modelling of the UNECE Air Convention and the EU-Forum for Air Quality Modelling in Europe (FAIRMODE). Presentations are available at: <http://www.iiasa.ac.at/TFIAM-FAIRMODE.html>
2. 60 experts attended the workshop. The following countries and parties to the Convention were represented: Belgium, Croatia, Czech Republic, Cyprus, Denmark, European Commission, Finland, France, Germany, Ireland, Italy, The Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Other bodies represented were: Airclim, the EMEP Centre for Integrated Assessment Modelling (CIAM), CONCAWE, the European Environment Bureau (EEB) and JRC.

## **II. OBJECTIVES OF THE WORKSHOP**

3. Mr. R. Maas (TFIAM-co-chair) presented that the objectives of the workshop were to assess the current possibilities to answer the following questions:
  - Which high-impact local/regional measures are available to reduce concentrations of particulate matter or NO<sub>2</sub>?
  - Which tools are available to assess the health benefits of local/regional measures?
  - How cost-effective are local/regional measures compared to additional national/European measures?
  - What are the opportunities and barriers for a multi-level approach?

## **III. GENERAL INTRODUCTIONS**

4. Mr. R. Korenromp (Netherlands and leader of the European Urban Partnership on Air Quality) highlights that future air quality plans need to go beyond meeting air quality limit values if we want to address health impacts from air pollution and that such plans should include considerations of inequality and cost-effectiveness (<http://urbanagendaforthe.eu/partnerships/air-quality/> ).
5. Mr. E. Pisoni from JRC presented work within the urban partnership and concluded that from an aggregated perspective there are a limited number of local measures available but it is not easy to assess which measures would be financially, socially or legally acceptable in specific cases. Furthermore, sectoral measures at the national or European scale will still be important, presumably in combination with tailored local measures (<http://fairmode.jrc.ec.europa.eu/measure-catalogue/> ).

6. Ms. L. Rouil (UNECE-EMEP) presented the complex interactions between local, national, and continental scales for managing air pollution. Local air quality is affected by transboundary sources, but cities are also sources for transboundary dispersion of emissions and local air quality governance will have transboundary impacts. Multi-scale action plans are required for developing efficient air quality plans.

7. Mr. M. Amann (CIAM) presented the share of transboundary sources to average air quality in European and Asian cities. Even in New Delhi (20 million inhabitants) local sources only contribute 40% to the average concentrations of PM<sub>2.5</sub>. He also presented the cost-effectiveness of European-scale measures and a GAINS methodology developed for the Pollution Management and Environmental Health Program for Hanoi to assess the cost-effectiveness of measures implemented in the city, the neighbouring cities and nation-wide.

8. Ms. M. Muhlhaus and Ms N. Allemand presented a recent assessment of potential measures to improve air quality in and around Paris, using a multi-criteria approach that included cost-effectiveness and legal and social feasibility. Among all the measures for various sectors that were analysed, the low emission zone remained the most efficient measure. Consensus building was an important element during the process of developing of the air protection plan. The conclusion was that active communication with stakeholders was very important to design a successful and accepted strategy (<https://www.maqualitedelair-idf.fr/c'est-quoi/>; <http://www.driee.ile-de-france.developpement-durable.gouv.fr/energie-climat-air-r35.html>; <https://www.citepa.org/en/>)

9. Mr. A. Eisold presented (on behalf of Mr. F. Pfäfflin) an assessment of local air quality measures implemented in Germany, focussing on low emission zones and traffic management. The main conclusion was that multiple local and (inter-)national measures would need to be combined in order to meet air quality limit values for NO<sub>2</sub> in German cities (<https://www.umweltbundesamt.de/en/publikationen/inventory-effectiveness-of-measures-to-improve-air>).

10. Mr. A. González Ortiz (EEA) presented results of the Air Implementation pilot project that analysed, among others, technical, cultural, legal, economic and political challenges for implementation of measures. Cities participating in the pilot indicated the need for help in improving local emission inventories and modelling tools as well as legal tools to address sources like domestic heating and non-road machinery (<http://www.eea.europa.eu/publications/air-implementation-pilot-2013>).

#### **IV. REGIONAL AND NATIONAL APPROACHES**

11. Mr. A. Piersanti presented an assessment of Italian air pollution measures as considered in the Po Basin Agreement. The study also took into account the impacts of envisaged nation-wide measures. The set of measures analysed, will not be sufficient to meet air quality limit values by 2020 nor by 2030. More measures at all geographical scales would be needed to meet these targets.

12. Mr. G. Guariso presented a cost-benefit analysis of additional air quality measures in the Lombardia region (in the Po Basin), which included fuel savings and monetised health benefits. Some infrastructural projects (e.g. a metro line) are not cost-effective when looking at health impacts alone, but could be acceptable for other reasons (e.g. accessibility). Instead of attributing their costs to air quality plans, the total net-benefits of such projects could be assessed, taking into account the costs of

avoiding negative effects for other policy targets ([http://www2.arpalombardia.it/qariafiles/varie/relazione\\_progetto%20VALUTA.pdf](http://www2.arpalombardia.it/qariafiles/varie/relazione_progetto%20VALUTA.pdf)).

13. Mr M. Stortini presented the air quality plan for the Emilia Romagna region (in the Po Basin). It showed how the RIAT+ tool had been used to define the regional air quality plan and how this helped regional authorities to identify non-intuitive measures (such as agricultural measures) that would be needed to improve air quality in cities (<http://www.riatplus.eu/html/eng/home.html> ).

14. Mr. G. Velders presented the Dutch national co-operative program to combine national and local measures. Strict legal interpretation of the EU-directives requires that new activities and projects can only be permitted if it can be proven that air quality limit values and nitrogen deposition targets will not be exceeded. The program is based on a long term projection that includes the assumption that all countries will meet their national emission ceilings, as well as envisaged infrastructure projects (e.g. new highways, harbours and airports). It contains the funding for both national and local abatement measures. The aim of the program is to reduce emissions from existing sources sufficiently as to create space for new activities within the environmental constraints.

15. Ms. C. Hendriks presented an assessment of short-term ammonia measures during PM episodes in Flanders. At the scale of Flanders a delay in manure spreading did not show a substantial impact on the PM-concentrations.

## V. LOCAL APPROACHES

16. Mr. S. Janssen presented modelling work for Antwerp that showed the effectiveness of traffic measures, such as tunnelling the ring road, building a new ring road or creating vegetation barriers for meeting air quality limit values at specific 'hot spots'. Urban planning strategies would be required, as end-of-pipe measures (e.g. a low emission zone) alone would be insufficient to meet such a target everywhere.

17. Mr. C. Ågren presented a cost-benefit analysis of the abatement of NO<sub>x</sub> emissions from ships. Both the introduction of a Nitrogen Emission Control Area in the North and Baltic seas and NO<sub>x</sub> levy would have net benefits for Europe. But the use of a NO<sub>x</sub> levy would reduce emissions faster since it also applies to existing ships.

18. Mr. C. Trozzi presented an assessment of potential abatement measures in port areas in the Liguria region, northern Italy. The cost-effectiveness analysis showed that shore-side electricity for ships could reduce local emissions by around 40% at a cost of 5-12 €/ton NO<sub>x</sub>, but that costs are sensitive to electricity prices and oil prices. The lack of coordination between harbours and the legal constraint to subsidize electricity for ships has thus far blocked the introduction of the measure. Mr Trozzi also introduced the Claircity project that aims at citizens' awareness raising, participation and behavioural change through surveys, apps and games.

19. Mr. F. Ferreira and Mr. N. Barros presented how air quality measures were defined and implemented in Lisbon, Portugal. Several measures were implemented. Only traffic measures (e.g. a low emission zone to ban old vehicles) had a measurable effect on local air quality.

20. Mr. F. Martin Llorente presented measures used to improve local air quality in Spain. Traffic management proved to be effective measure to reduce exceedance of limit values at 'hot spots'. The impact of cleaner fuels for domestic heating and

photocatalytic pavements had a low impact. Street trees seem to reduce dispersion, but vegetation barriers could protect pedestrians against pollution from traffic. However, no conclusive results were obtained and more studies are needed. Results of the analyses of the impacts of traffic measures taken in Madrid during the high pollution episode in December 2016 will become available shortly.

21. Mr R. Friedrich presented an assessment of the synergies between air pollution and greenhouse gas abatement measures. The analysis re-confirms that air pollution plans and climate mitigation plans need to be integrated in order to achieve optimal solutions. In a combined strategy a modal shift from air to rail, low emission zones, a kerosene tax, and shipping measures are most effective. The most cost-effective measure was enhancing the use of bicycles, even when travel time losses would be included (<http://www.transphorm.eu/>).

22. Mr. M. Barrett presented the potential for air quality improvements from urban energy policy. In a participatory process in Birmingham: energy poverty, climate change and health were identified as main challenges. Insulation, district heating, a modal shift from cars to bicycles and public transport, combined with more electric vehicles (based on wind and solar power) were, among others, selected as preferred options to address these challenges. Models showed that such a combined strategy would significantly reduce concentrations of NO<sub>2</sub> in the coming decades. For PM results would be more dependent on emission reductions outside the city.

23. Ms. Claire Holman illustrated the effectiveness of legal actions by citizens to press local and national governments to enforce air quality regulation and protect health and nature.

24. Mr. M. Savolahti presented the Finnish national energy and climate strategy for 2030. Though PM<sub>2.5</sub> concentrations are expected to decline, the health benefits will to a large extent be cancelled out because of aging, urbanisation and immigration. The city of Helsinki started an information campaign to advise the population how to contribute to reducing emissions from sources like wood burning and tyre wear.

25. Mr. J. Bak presented the successful strategy to stimulate cycling in Copenhagen (Denmark). Currently, cycling reduces the city's transport sector CO<sub>2</sub> emissions by 15%. The mortality risk (from air pollution and traffic accidents) was reduced by 28%. The social benefits of cycling were valued at US\$ 0.2/km.

## VI. CONCLUSIONS

26. The workshop finding from the workshop are:

- There are no effective local measures to reduce particulate matter concentrations during episodes (with the exception of cities that are not substantially affected by surrounding sources).
- Regional and transboundary policy coordination remain needed.
- Low emission zones and traffic management were local measures that most often applied. Promotion of cycling, the use of public transport and shore-side electricity for ships seem to be cost-effective local measures. Control of domestic wood burning and combining urban energy policy with air pollution policy seem promising. At the national and international level measures to reduce ship emissions are cost-effective. Fewer restrictions on the use of

economic instruments could enlarge the choice of policy instruments at the local level.

- Photocatalytic paint does not seem to be effective. Scrubs could form barriers between car exhausts and pedestrians. Street trees reduce dispersion of pollution.
- Reduction of agricultural emissions and reduction of tyre wear are a blind spot in many local air quality plans.
- Health is currently not a central issue in local air quality plans. Now that air quality limit values are met for most of the European population, and acknowledging that still substantial health benefits can be gained, the focus of local modelling and measurements should shift towards assessment of the impact of measures on average population exposure.
- By calculating the costs per life years gained the effectiveness of local, national and European wide measures can be compared. It remains important to assess co-benefits of air pollution abatement on climate, noise and nature, to assess who will pay for or gain from measures, and to what extent inequality issues (e.g. the accumulation of energy poverty, unequal exposure to air pollution and noise) can be addressed jointly.

27. The workshop participants advise to further develop a methodology to include the cost-effectiveness of local and regional measures in developing future air quality strategies aimed at long term targets for health and nature. It is recommended to include more local knowledge in international networks that support air policy formulation. National and international authorities are called upon to stimulate (and fund) a larger involvement of local experts.

28. Relevant links:

- <http://www.unece.org/index.php?id=42861&L=0>  
<http://gains.iiasa.ac.at/index.php/tfiam/>  
[http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/TSAP\\_12\\_final\\_v1.pdf](http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/TSAP_12_final_v1.pdf)  
<http://fairmode.jrc.ec.europa.eu/>  
<https://ec.europa.eu/jrc/en/news/sherpa-computational-model-better-air-quality-urban-areas>  
<http://urban.jrc.ec.europa.eu/?ind=access&ru=fua&s=0&c=1&m=0&f=1&p=0&swLat=24.84656534821976&swLng=-45.3515625&neLat=65.58572002329472&neLng=67.1484375>
- <http://urbanagendaforthe.eu/>  
[http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans\\_en.html](http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans_en.html)  
<http://www.sustainablecities.eu/transformative-actions-database/>
- <https://www.eionet.europa.eu/aqportal/toolbox/papers>  
<http://airuse.eu/en/outreach-dissemination/reports/>  
<http://www.joaquin.eu/Knowledge/Decision-Support-Tool/page.aspx/121>  
<http://www.inherit.eu/>  
<http://claircity.eu/>  
<http://icarus2020.eu/>
- [http://www.theicct.org/sites/default/files/publications/ICCT\\_real-world-NOX-RDE-2015-2030\\_dec2016.pdf](http://www.theicct.org/sites/default/files/publications/ICCT_real-world-NOX-RDE-2015-2030_dec2016.pdf)  
[http://www.theicct.org/sites/default/files/publications/Euro-VI-versus-6\\_ICCT\\_briefing\\_06012017.pdf](http://www.theicct.org/sites/default/files/publications/Euro-VI-versus-6_ICCT_briefing_06012017.pdf)  
[http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/12\\_Lumbraas\\_TFIAM45.pdf](http://www.iiasa.ac.at/web/home/research/researchPrograms/air/policy/12_Lumbraas_TFIAM45.pdf)  
<https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/improving-air-quality>  
<http://www.developpement-durable.gouv.fr/index.php/politiques-publiques-reduire-pollution-lair#e5>