Environment and Climate Regional Accession Network ECRAN

Environment and Climate Regional Accession Network (ECRAN)

Report on 3rd Workshop on Air Quality Modelling, and 2nd Annual Working Group Meeting

20-21 October 2015, Ankara

Enviroment and Climate Regional Accession Network ECRAN

ENVIRONMENT AND CLIMATE REGIONAL NETWORK FOR ACCESSION - ECRAN

WORKSHOP REPORT

Activity 2.5

REPORT ON 3RD WORKSHOP ON AIR QUALITY MODELLING AND 2ND ANNUAL WORKING GROUP MEETING

20-21 October 2015, Ankara, Turkey

This Project is funded by the European Union

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LIST OF ABREVIATIONS	
ABS	Accreditation Body of Serbia
AQ	Air Quality
AQD	Air Quality Directive
AQMEII	Air Quality Modelling Evaluation International Initiative
BAT	Best Available Techniques
CAFE	Clean Air For Europe
CAPRAM	Chemical Aqueous Phase Radical Mechanism
CAR	Contaminants in the Air from a Road
CEMSA	Consolidation of the Environmental Monitoring System in Albania
CHIMERE	not available
COSMO	Consortium for Small-Scale Modelling
DWD	German Weather Service
ECMWF	European Centre for Medium-Range Weather Forecasts
EPA	Montenegrin Environmental Protection Agency
EU	European Union
FAIRMODE	Forum for Air Quality Modelling in Europe
FMI	Finnish Meteorological Institute
FMI-ENFUSER	Finnish Meteorological Institute's Environmental information Fusion Service
FORE	Forecasting Of Road Dust Emissions
GHG	Greenhouse Gas
GMES	Global Monitoring for Environment and Security
GRAL	The Graz Lagrangian Model
GRAMM	Graz Mesoscale Model (Eulerian Model)
HM	Heavy Metals
ICT	Information and Communication Technologies
IPA	Instrument for Pre-accession Assistance
JRC	Joint Research Centre
LRTAP	Long-range Transboundary Air Pollution
LUR	Land Use Regression
MACC	Monitoring Atmospheric Composition and Climate
MAEP	Ministry of Agriculture and Environmental Protection in Serbia
MPI	Model Performance Indicators
MQO	Model Quality Objective
NEC	National Emission Ceiling
NECD	National Emission Ceiling Directive
OPS	Operational Priority Substances Model
OSM	Open Street Map
PM	Particulate Matter
PRTR	Pollutant Release and Transfer Register
SEPA	Serbian Environmental protection Agency
SILAM	System for Integrated Modelling of Atmospheric Composition

LIST OF ABREVIATIONS	
SMHI	Swedish Meteorological and Hydrological Institute
SRM	Standaardrekenmethoden
STEAM	Ship Traffic Emission Assessment Model
THREDDS	Thematic Real-time Environmental Distributed Data Services
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nation Framework Convention on Climate Change
VAST	Volcanic Ash Strategic-initiative Team
VOC	Volatile Organic Compounds
WRF	Weather Research Forecasting

I. Background/Rationale

Based on discussion in the course and following a workshop on the NEC Directive (NECD), it was decided by the beneficiaries to dedicate the forthcoming workshop to air quality modelling. With the help of a questionnaire the current situation and future needs with respect to air quality modelling were investigated and used as a basis for the design of the training workshop. The training aimed at the following overall topics:

1. Overview on requirements and possibilities of simple models, mainly for local scale applications, point sources;
2. Overview on requirements and possibilities of more complex models, mainly for local to regional applications (e.g. complete analysis of city);
3. Overview on requirements and possibilities of chemical transport models (regional to international scale, complex pollutants such as ozone, PM, etc.).

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II. Objectives of the training

General Objective

To assisting ECRAN countries in the implementation of topics related to the Air Quality Directive.

Specific Objective

Capacity building regarding improving the understanding of possibilities and limitations of air quality models with various complexities on different spatial scales.

In addition, the annual working group meeting took place on the morning of the first day.

Results/outputs

The expected results are:

- Improved understanding of the possibilities and limitations of air quality models, the required input and infrastructure, as well as the accompanying costs;
- Exchange of information on the topics described above between ECRAN countries and European Member States.

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III. EU policy and legislation covered by the training

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Air pollution has been one of Europe's main political concerns since the late 1970s. European Union policy on air quality aims to develop and implement appropriate instruments to improve air quality.

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe entered into force on 11 June 2008.

This Directive includes the following key elements:

- The merging of most of existing legislation into a single directive (except for the fourth daughter directive) with no change to existing air quality objectives;
- New air quality objectives for $PM_{2.5}$ (fine particles) including the limit value and exposure related objectives – exposure concentration obligation and exposure reduction target;
- The possibility to discount natural sources of pollution when assessing compliance against limit values;
- The possibility for time extensions of three years (PM_{10}) or up to five years (NO_2, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

The directive requires Member States to ensure that up-to-date information on ambient concentrations of the different pollutants is routinely made available to the public as well as to other organisations. This is done by providing information on websites, teletext, in press and also by public displays. The information needs to be updated as appropriate to the averaging periods. The relation to the different limit and target values needs to be clear. When information or alert thresholds are exceeded Member States need to inform the public about the exceedance and the actions that are eventually taken.

Also, the Commission has adopted a Clean Air Policy Package in December 2013, consisting of a new Clean Air Programme for Europe with a revised National Emission Ceilings Directive with stricter national emission ceilings for the six main pollutants, and a proposal for a new Directive to reduce pollution from medium-sized combustion installations.

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IV. Highlights from the training workshop – annual meeting

Welcome and Opening – Mr. Andrzej Januszewski

In his welcome speech Mr. Januszewski emphasised the importance of air quality in the environmental acquis even though it is a rather difficult part of the acquis. Air quality thresholds are still exceeded in many regions in Europe, which requires efforts on European but also on local level. Mr. Januszewski highlighted the Clean Air Policy package, which was presented by the European Commission in December 2013. This package aims at reducing the impact of $PM_{2.5}$ by half until 2030. He presented the current status of the negotiations in the European Parliament and the Council. The Medium Combustion Plant Directive, which is part of the package, should be published by the end of 2015. Negotiations are still ongoing for the revised NECD. Within the Clean Air Forum an international conference is foreseen for spring 2017. Mr. Januszewski expects that the Council will soon come to an agreement concerning a Decision to accept the amendments to the Gothenburg Protocol. Finally he stressed the need for cooperation on national and international level, offered the Commission's support to the ECRAN countries and thanked the organizers of the workshop.

ECRAN Annual Meeting Air Quality Working Group – Mr. Christian Nagl

Prior to the workshop, a questionnaire was distributed to the participants with the aim at assessing the impact of the two workshops held so far on the Air Quality Directive (AQD) and the National Emission Ceilings Directive (NECD). The main objective of this questionnaire was to discuss the impact during the annual WG meeting in a structured way.

The questionnaire should have contained the answers regarding the current status of implementation of AQD and NECD, impacts of the previous workshops, implementation, assessment and managements of the directives. Five countries presented the results of the questionnaires: Albania, Bosnia and Herzegovina, Kosovo*[1], Serbia and Turkey. The results of the workshop have shown that the implementation of NECD is not yet completed. Improvements of emission inventories is very much needed, since regarding the Directive, they are most valuable. The questionnaire can be found in Annex IV of the report.

Status of NECD has however changed, since in 2013, EU Air Quality Policy was revised. Main changes occurred so far concerning binding targets by 2025, reporting requirements, and possibility of deleting CH_4 commitments and shipping flexibility.

Discussion was opened on future ECRAN Activities. Fuel Directive and Petrol Directive are still opened subjects for the next workshop.

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

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Results of the Questionnaire – Mr. Christian Nagl

Current use of models in the ECRAN countries (from the questionnaires received) is shown on the table below.

	AL	ME	MK	RS	TR
Current use	-	-	UDM-FMI and CAR-FMI SILAM	-	CMAQ
Pollutants	CO, NO_X, PM_{10}, $PM_{2.5}$, SO_2	BaP, PM_{10}, $PM_{2.5}$,	NO_X, PM_{10}, SO_2	NO_X, O_3, PM_{10}, SO_2	AQD pollutants
Emissions	Industry and power plants	national, LRTAP pollutants	Traffic, industry, power plants (NO_X, $PM_{2,5}$, SO_2)	national level (SO_2, NOx, PM_{10})	CMAQ species on 1x1 km²
Meteorology	observations	no info	observation, pre-processed	observations, Hydromet. Service (RHMS)	pre-processed data from other sources
Budget (personnel / direct costs)	3-4 people / 50,000€	0 / 0	1 / 0	½ / 0	5 + 7*4 / no info

The objectives of modelling in the ECRAN countries are shown in the following table.

	current / future main objectives				
	AL	ME	MK	RS	TR
Spatial distribution	y	y	y / y	y	no / y
Compliance?	y	y	y / y	y	no / y
Forecast, information	y	y	y / y	y	no / y
Analysis sources, source apportionment	y	y	no / y	y	no / y
Scenarios	y	no	no / y	no (for now)	no / y
Impact of measures	y	y	no/ y	y	no / y
Permitting / Licensing / Regulatory purposes	y	no	y / y	no (for now)	no / y
Exposure assessment	y	y	no/ y	y	no / y

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Air Quality Management in Albania – Ms. Aspri Kapo, Ms. Gjystina Fusha

Albania ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, the Kyoto Protocol in 2004, and the Long Range Transboundary Air Pollution (LRTAP) Convention in 2005. In order to comply with these Conventions, Albania has to produce annual emission inventories containing updated data on emissions of greenhouse gases (GHG) and air pollutants, respectively.

The air emissions inventory from 1990 to 2010 were completed with the project "Consultancy services in the sector of the Air Pollutants Emission Inventories Implementation and Air Quality Planning in Albania" implemented by Techne Consulting. Albania issued the law on the accession of the Protocol of UNECE for release and transfer of pollutants in 2006. A new Law on the protection of environment was adopted in 2011, and a law on environmental permits was amended in 2011 as well. Consolidation of the Environmental Monitoring System in Albania (CEMSA) assisted NEA through training with the subject of PRTR.

A National Air Monitoring Network was established in 2005. In 2015, six automatic monitoring stations are in operation and also one manual station, four traffic locations and three urban background locations, which are located according to Ambient Air Quality Directive. Measured indicators include SO_2, NO_x, CO, O_3, Volatile Organic Compounds (VOC) and particulate matters. Monitoring is done in 18 cities and 42 other locations for NO_2 and O_3. Air quality data is received and sent to the local database, then transmitted to a server in Austria. Monitoring is performed under the Air Quality (AQ) Directive.

Air Quality Management in Montenegro – Ms. Gordana Djukanovic

A National Strategy for AQ Management in Montenegro was adopted in 2012. An AQ Monitoring Network was established in 2011 in accordance with EU legislation. In 2015, five pollen monitoring networks were set, and with IPA funds the AQ network is improved. An AQ Plan for the City of Podgorica was finalised, ensuring the full transposition of AQ Directive.

The Montenegrin Environmental Protection Agency (EPA) has started activities for establishing a National Air Quality Network, foreseeing monitoring sites in three zones, South Critical Zone, North Critical Zone and Maintenance Zone.

Even though there is a small number of industrial installations, they present the main sources of air pollution, along with transport and heating systems. The most polluted city in the country is Pljevlja, because of the thermal power plant. PM_{10} annual mean levels in the city are 79 µg/m^3~~.~~, SO_2 values are however, the highest in Podgorica (24 µg/m3). For the eight monitoring sites, concentration of pollutants is being monitored on an hourly basis. AQ monitoring network started with 5 automatic stations in 2009. Now there are 7 and with IPA funds insured, in 2016/17 there will be total 10 including one functional EMEP station. The same project will provide for lab equipment and revision of the network. There is a plan to make a pilot health impact assessment in Pljevlja with support of WHO, and also a plan to enlarge network for pollen.

Air Quality management in Serbia – Ms. Dusica Radojicic

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Within the Ministry of Agriculture and Environmental Protection, there is an Air and the Ozone layer protection unit with six employees performing tasks related to:

- Air protection;
- Ozone layer protection;
- Transboundary air pollution;
- Implementation of Convention on Long-range Transboundary Air Pollution;
- Implementation of the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer.

The Law on the Air Protection regulates AQ Management and transpose some provisions of the AQ Directive. Ambient Air Quality Directive and 4th Daughter Directive are transposed through laws, regulations and rulebooks. Provisions that set obligation of EU member state towards the European Commission will be transposed by the date of accession.

Responsibility for implementation of laws and regulations is divided to five institutions:

- Ministry of Agriculture and Environmental Protection (MAEP);
- Serbian Environmental protection Agency (SEPA);
- Accreditation Body of Serbia (ABS);
- Provincial Secretariat for Urban Planning, Construction and Environmental Protection;
- Local self-governments.

Administrative capacities are being strengthened through various funds, such as IPA and TAIEX. A preliminary AQ Assessment in Serbia was done in 2010 with the help of EU funds. Data from 2005-2009 was used for the assessment, and the assessment regime was determined based on data from the Automatic Monitoring Stations. The National Automatic Monitoring Network consists of 36 AQ monitoring stations of SEPA and additional four stations established after adoption of the National Air Quality Control Programme. Unfortunately, complete data sets for some station in the National Automatic monitoring network are not available because of insufficient funding for maintenance and servicing.

The manual monitoring network consists of 18 authorised laboratories, and uses manual methods at 32 monitoring sites in 21 towns in Serbia. An evaluation of the National Air Quality Monitoring Network was performed in 2011/2012.

AQ Modelling has not sufficiently been used for AQ assessment and AQ planning. For the pilot study of Air Quality Modelling of SO_2 in Belgrade, AERMOD dispersion model has been used, while for the analysis of the traffic impact on the emission of NO_2 and PM_{10} in Novi Sad study, PROKAS dispersion model has been used. In Belgrade, adoption of AQ plan is expected by the end of 2015, while preparation for AQ plan has started in four more cities (Novi Sad, Pancevo, Smederevo, and Uzice). The annual report on the state of AQ in the Republic of Serbia is prepared and published by SEPA.

The main impulse to the establishment of national automatic monitoring of air quality in Serbia was the CARDS project "Supply of Equipment for Air Quality Monitoring Stations, Serbia" by EUROPEAID. With this project, certain equipment was donated, such as 28 monitoring stations, calibration and analytical laboratory. The current project IPA 2012 „Establishment of an integrated environmental

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monitoring system for air and water quality", part "Supply of ICT equipment and software for Air Quality Monitoring System" will improve data management and consolidate all data of Ambient AQ monitoring. AQ data can be found on SEPA's website.

Annual values and the frequency of exceedances are part of the annual SEPA report. During 2014, 68.8% of the population of the Republic of Serbia had a clean or slightly contaminated air (category a). In the same period, 31.2% of the population had air quality that demands improvement (categories 2 and 3). Nevertheless, the situation is much better than in 2011, but also worse than in 2013.

Air Quality Management in Turkey – Ms. Funda Filiz

There are in total 200 AQ measurement stations in Turkey in 81 regions. Monitoring is done according to Ambient Air Quality Directive (CAFE Directive) through the EU Capacity Development Programme, including developing of monitoring stations.

Emission inventories are calculated on national, regional and local level. As it can be seen from the table below, emissions of some pollutants decreased compared to previous years. SO_2 emissions are a great burden to the country, mainly because of the vast usage of fossil fuels.

Year / Pollutants (kton/year)	2009	2010	2011	2012	2013
SO_2	2665	2561	2641	2716	1939
NOx	961	945	1120	1090	1047
NH_3	467	485	506	562	1090
NMVOC	963	977	985	1034	868
CO	2529	2546	3041	3304	2541
PM	714	805	748	831	756

The so-called Tubitak-Kamag project for the Marmara Region started in May 2013 and will end in May 2016. It aims at implementing AQ legislation.

- Emissions Calculation Module
  - Point sources;
  - Area sources;
  - Mobile sources;
- Emissions Processing Module
  - Gridding;
  - Smoke;
- Air Quality Module
  - WRF;

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   - CMAQ;
- Solid Fuel System;
- Manager Module.

Other modules used in for AQ management include dispersion models (EIA permitting process), photochemical models (management of air quality, and numerical weather-meteorological model) and study areas of photochemical models.

Turkey plans to implement AQ forecasting~~.~~ to inform the public. Also, an online system is in preparation.

Air Quality Management in Former Yugoslav Republic of Macedonia – Ms. Aneta Stefanovska

There are 17 monitoring stations in the country, measuring the following parameters: SO_2, NO, NO_2, NO_x, CO, O_3, PM_{10}, $PM_{2.5}$, and BTX. Indicative measurements of heavy metals (HM) have been performed as well. As Ms. Stefanovska presented, annual average concentrations of SO_2, NO_2 and CO have been decreasing in the last decade.

The national plan for air protection in the Republic of Macedonia for the period 2013-2017 was adopted, as well as the National Program for gradual reduction of emissions of certain polluting substances at the level of the Republic of Macedonia for the period 2012-2020. Local measures have been taken as well, such as the program for improvement of air quality and an action plan for reduction of pollution in city of Bitola. Both national plans include emission projections for SO_2, NO_x, NH_3 and VOC for the period 2015-2020.

Main emission sources on national level can be seen on the table below.

Contribution [%]	NOx	CO	SO_2	PM_{10}
Production of electricity and heating	55 %	5,13 %	93,82 %	9,13 %
Traffic	32,89 %	32,31 %	0,24 %	17,5 %
Households and administration heating	2,44 %	55,81 %	2,53 %	38,42 %
Production process	8,58 %	6,74 %	3,41 %	17,44 %
Other	1,09	0,01 %	/	17,51 %

Major reduction measures are needed especially for PM_{10} and SO_2. Best Available Techniques (BAT) are already being implemented in some sectors.

Air quality data is collected and reported in accordance with AQ Directive. The air emission inventory is collected and reported in accordance with EMEP/EEA Guidelines and obligations of CLTRAP and its protocols. In 2015, the inventory for 2013 for all pollutants was prepared and submitted, while recalculations were made for the period 2004-2013. The current twinning project "Further strengthening the capacities for effective implementation of the acquis in the field of air quality" with its four components is working on improving the implementation of EU legislation on AQ.

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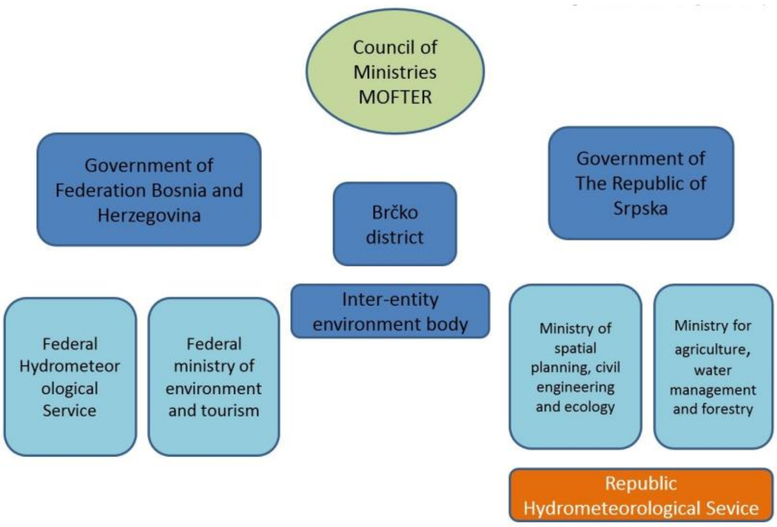
Air Quality Management in Bosnia and Herzegovina– Mr. Enis Omercic

Mr. Omercic firstly explained the governmental structure in Bosnia and Herzegovina (BIH), with its two entities and one district. The Republica Srpska entity has 64 municipalities, while the federation BIH entity is divided into 10 cantons, covering 84 municipalities. The Ministry of Foreign Trade and Economic Relations, in accordance with Constitution of B&H, is responsible for environmental activities at the State Level.

The AQD is partially implemented on local level. Methodology of measurements is similar to that in the Directive. However, there is currently neither a law on state level for AQ monitoring, nor laws defining obligations for reporting to EIONET and EEA. There is no meteorological database on a state level, but in two entities meteorological services are collecting and storing their own data. The following scheme describes the relevant bodies responsible for AQ in the country.



The following gaps were identified in the country:

- Lack of regulation;
- Lack of horizontal and vertical cooperation;
- Lack of administrative capacity for preparation subordinate legislation;
- Lack of expert capacity in official institutions.

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V. Highlights from the training workshop – modelling workshop

ECRAN Air Quality Modelling Workshop Introduction – Mr. Christian Nagl

Mr. Nagl presented the four topics that will be covered during the workshop:

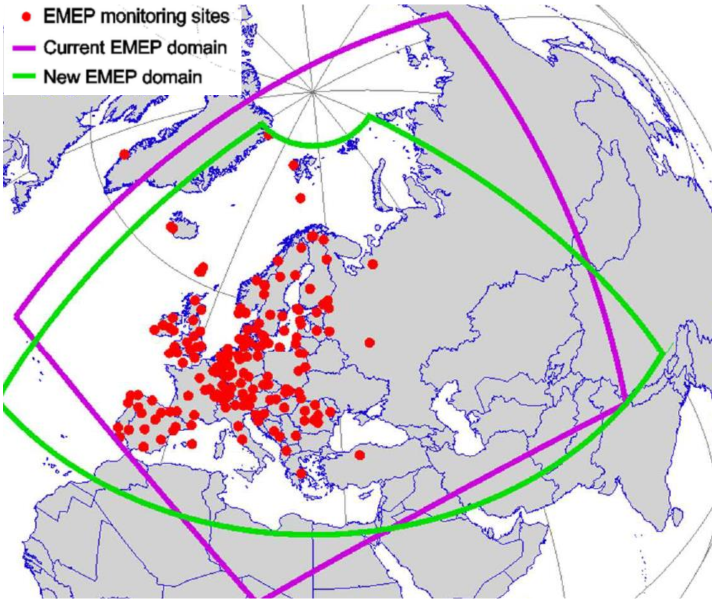
- Local to urban scale modelling;
- Regional scale modelling;
- Modelling for decision making;
- Modelling in beneficiary countries

At this point, BIH participants proposed a site visit to Finland to support the implementation of an AQ system.

European Modelling Activities – Mr. Christian Nagl

The presentation focused on three projects, namely the European Monitoring and Evaluation Programme (EMEP), Monitoring Atmospheric Composition and Climate (MACC), and the Forum for Air Quality Modelling in Europe (FAIRMODE).

The new EMEP grid was established in 2012 and is shown in the picture below.



EMEP emissions are used for the unified EMEP model, but also for MACC emissions and other regional models, such as CHIMERE. EMEP emissions are the basis for gridded emissions for modelling, as shown on the scheme below.

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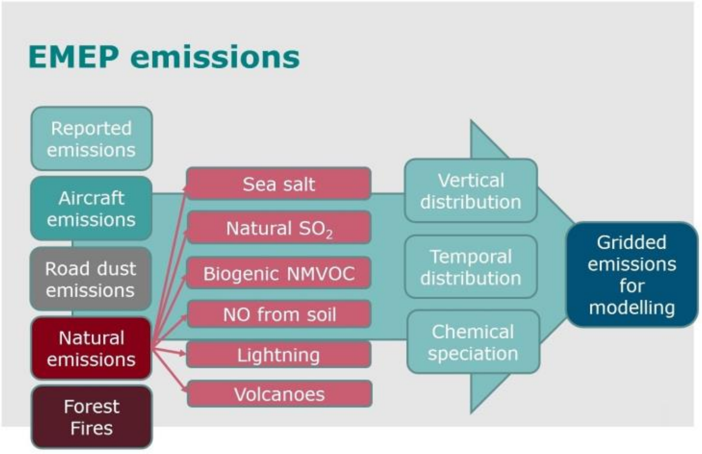


EMEP model results are used for policy development and country specific information data. Average concentration, exposure of ecosystem and deposition are parameters for the assessment of health and ecosystem impact on regional scale.

MACC II is a follow up project of MACC and started in 2011. The MACC project from 2009-2011 was part of the European Earth Observation Programme Copernicus. MACC II has three main input data stream: emission inventories, in-situ data, and satellite data. There are three main MACC products:

- Global records of greenhouse and reactive gases, aerosols;
- Global forecasts of reactive gases, aerosols;
- Regional forecasting and assessment of air quality for Europe.

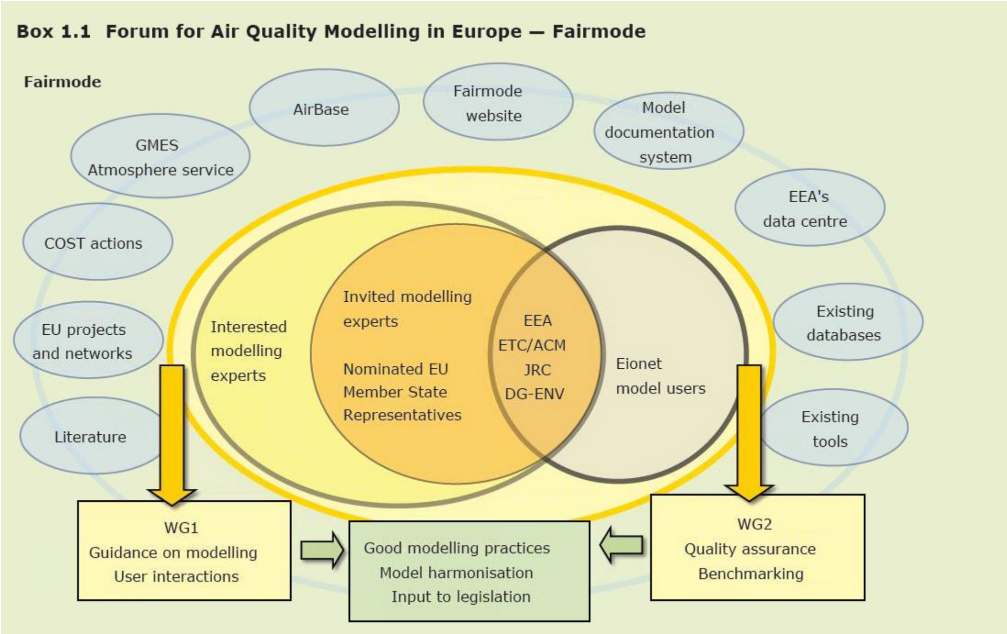
MACC is a pre-operational atmospheric service of the European GMES programme, and it provides data records on atmospheric composition for recent years, data for monitoring present conditions and forecasts of the distribution of key constituents for a few days ahead. MACC provides data and information on climate forcing by greenhouse gases and aerosols, long-range pollutant transport, European air quality, dust outbreak, solar energy, and many more. In the middle of 2015, MACC III has startedcovering the current pre-operational Copernicus Atmosphere Service.

TNO has developed a high resolution European emissions database for the MACC project.

FAIRMODE was set up by the European Environment Agency (EEA) and the European Commission Joint Research Centre (JRC) in 2007. Its aim is to bring together air quality modelers and users to promote and support the harmonised use of models by EU Member States, with emphasis on model application under the EU AQ Directives. National experts are nominated by the MS. FAIRMODE objectives include:

- Providing a permanent European Forum for AQ modellers and model users;
- Guidance on the use of AQ models;
- Protocols and tools on the QA of AQ models;
- Recommendations for further research.

In the framework of FAIRMODE, the Delta tool has been developed, which is a software that supports the evaluation of model applications performed in the frame of the AQ Directive. Based on paired modelled and monitored data, it offers rapid diagnostic of model performance in terms of various statistical indicators and diagrams. The FAIRMODE organisational scheme is presented on the following picture.



Chemical weather forecasting and assessment: SILAM – Mr. Ari Karppinen

SILAM is a global model developed for atmospheric composition, air quality, and emergency decision support applications, as well as for inverse dispersion problem solution. The model consists of several parts developed at several institutes, but the overall coordination and the system maintenance is performed by the Finnish Meteorological Institute (FMI). The model requires gridded basic meteorological data and appropriate information on emission, as well as basic physiographical information. SILAM applications include:

- Short-term forecasting and re-analysis
  - atmospheric chemical composition;
  - allergenic air pollution;
  - plumes of wild-land fires;
- Emergency preparedness
  - nuclear ;
  - volcanic
- Source apportionment studies
  - anthropogenic sources;
  - natural sources: allergenic pollen, volcanoes, fires;
- Risk assessment
  - chemical ;
  - nuclear;
- Climate change forcing and impact.

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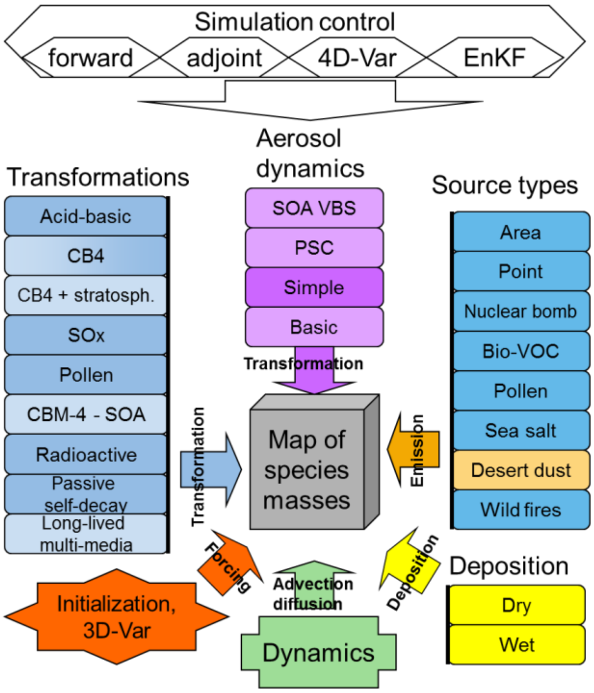
SILAM v.5.5 was introduced in February 2015. SILAM contains nine chemical and physical transformational modules, of which seven are open for operational use. It also includes eight source streams. The modules scheme is shown below.



Dynamics of SILAM covers Eulerian and Langrarian schemes for transport routines:

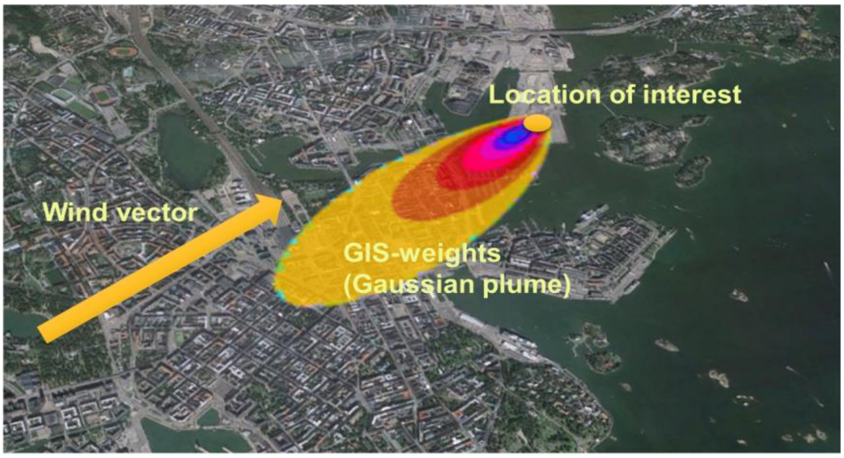
- Eulerian
    1. Split the domain in grid cells;
    2. Track the mass budget of each cell;
    3. Turbulent mixing described as diffusion;
    4. SILAM v4. V5.x.
- Langrangian
    1. Track the motion of the pollutant represented by finite number of model particles;
    2. Count model particle density to obtain concentration;
    3. Turbulent mixing described as random process;
    4. SILAM v4. V5.x.

General diferences between SILAM and EMEP can be seen in the table.

		SILAM	EMEP
Number of Species	Reactions	27	71
Number of reactions	photochemical	12	24
	inorganic	27	21
	methane	12	11
	ethane	2	15

Evaluation of Air Quality using Fusion of Environmental Information – Mr. Ari Karppinen

The Finnish Meteorological Institute's Environmental information Fusion Service (FMI-ENFUSER) is an operational service prototype aiming to produce on-demand, high resolution air quality maps describing previous, current and forecasted urban air quality on an hourly basis. The FMI-ENFUSER service combines statistical air quality modelling (Land Use Regression - LUR), dispersion modelling techniques (Gaussian plume) and information fusion algorithms.



Next to static GIS-information describing the environment, the ENFUSER uses air pollutant and meteorological measurements as input data. Moreover, a collection of modelled data can also be used in parallel with measurements. So basically all kinds of information available can be used, modelled or measured data, accurate or inaccurate, describing conditions near or far away. Such data can be Open Street Map (OSM), population density mapping, and so on.

For example in Finland, ENFUSER was calibrated with 2011 data from another region. Then, ENFUSER predicted hourly concentration of NO_2 in 38 locations near Helsinki in 2010. Predicted seasonal averages were compared against measured averages.

Air Quality Assessment and Assessment at FMI – Mr. Ari Karppinen

Mr. Karppinen presented sources of air pollution, AQ forecasting and assessment. Air pollution sources can be anthropogenics, biogenic from vegetation, natural, and from wildland fires. 40% of NO_x and 50% of SO_X of total EU anthropogenic emission come from marine traffic. Also, wildland fires contribute 10-50% of European anthropogenic emission of PM and some gases, such as CO. Thus, goals of AQ forecast and assessment are to:

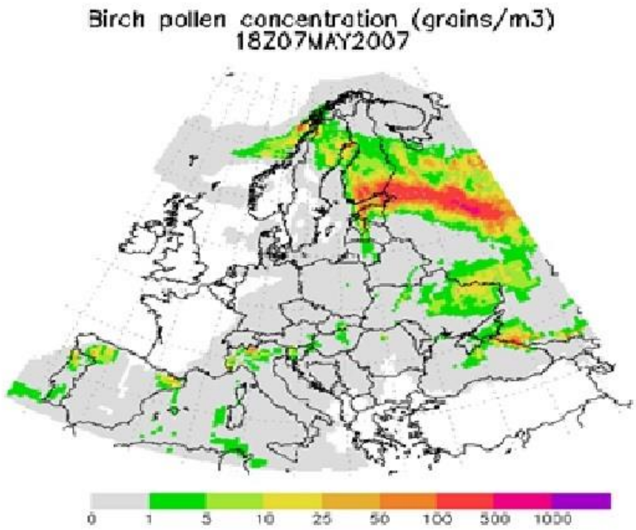
- Inform the public and authorities about the AQ situation;
- Provide AQ forecast – decision support for short-term abatement;
- Provide AQ assessment – analysis for long-term decision-making.

The European service chain of models comprises global and european models, regional and local/urban models. Global and European model products are provided by MACC, and regional and local products by PASODOBLE. MACC is coordinated by the European Centre for Medium-Range Weather Forecasts (ECMWF).

Mr. Karppinen briefly described applications of the SILAM model. He also added that it was developt with a joint effort of universities in Finland, Russia, Estonia, Austria and Israel, and it is used in the EU, but also in the Macedonian Environmental Information Center. SILAM application types can help to predict various impacts, as well as readiness for those impacts, such as emergency preparedness for volcano eruptions, climate change impact, impact on ecosystems and human health, etc.

Thematic Real-time Environmental Distributed Data Services (THREDDS) was also discussed. THREDDS is a web server that provides metadata and data access for scientific datasets.

SILAMis also used for pollen forecast. Pollen concentrations are provided to inform people who are allergic to pollen. In order to produce a forecast map, it is important to provide all necessary input data, which include vegetation map, pollen productivity, and meteorological forecast. The most widely used system is SILAM-Birch/Olive pollen forecasting system, which includes detailed input data on start of flowering, number of pollen grains and temperature difference, see example below.



Trends have shown that in the last few decades, concentration of grass and olive pollen increased, while birch and reweed pollen decreased. Goals of the fire system are to forecast plume dispersion and support AQ assessments. Major plumes from wildland fire are forecasted using remote sensing and ground-based observations.

The Volcanic Ash Strategic-initiative Team (VAST) uses of 4D-Var method for forecasting. Experimental assimilation of the Grimsvot eruption was shownfor the period 22-28 May 2011. A 72-hours forecast and 72-hours assimilation for this case is shown on the following picture.

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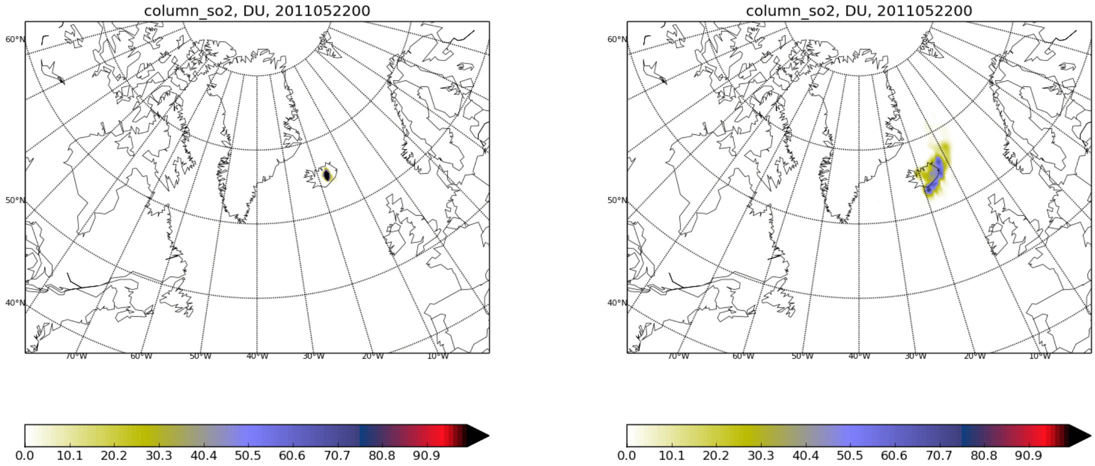
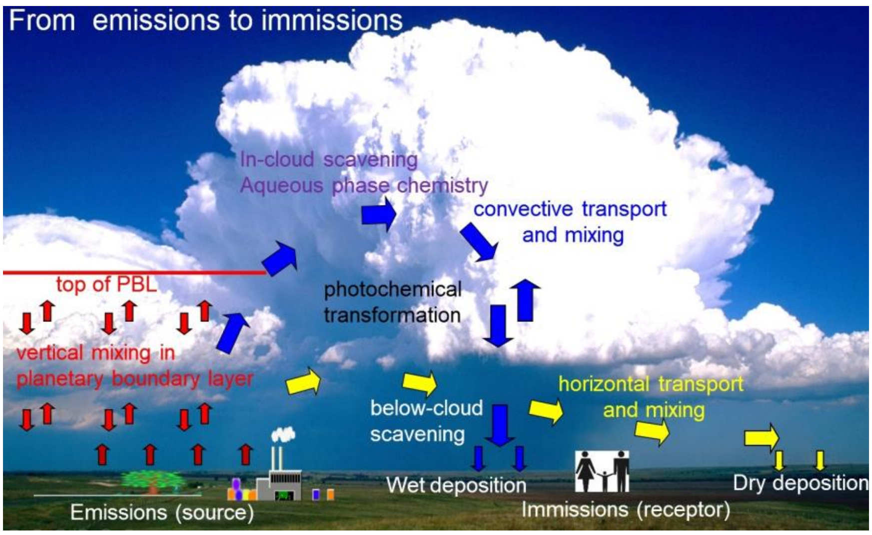


The Ship Traffic Emission Assessment Model (STEAM) was also briefly presented. The STEAM model has general applicability, on local, regional and global level; it includes also emission abatement modelling.

Regional Modelling: Concepts and Challenges – Mr. Stephaen Henne

Since Mr. Henne could not join the workshop in Ankara, he held a online presentation.

Air pollutants can be classified as primary and secondary. Primary pollutants are directly produced and emitted. Examples are NOx, SO_2 and NH_3. Secondary pollutants are formed in the atmosphere through photochemistry. Examples are O_3, HNO_3, H_2SO_4 and PAN. The entire cycle of pollutants is described the following picture.



Mr. Henne described the basic principles of regional chemical transport models (CTM), a

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typical configurations, and necessary initial and boundary conditions such a meteorology, chemical parameters, emissions.

He also described the basic underlying processes of a CTM and the principles of offline and online coupling.

In addition, he gave an overview of chemical mechanisms used for state-of-the-art CTM and the calculation of the chemical composition of aerosols.

He concluded that CTM are required to analyse secondary pollutants (ozone, PM), that CTM are complex and require a lot of input data and computational power.

Regional Modelling: Evaluation & Applications – Mr. Stephean Henne

Mr. Henne presented first of all the COSMO-ART model system used at EMPA and some general considerations of model evaluation. Evaluation results for the COSMO ART model system were shown for gases, the diurnal variability and aerosol chemical composition. He also showed comparisons with satellite NO_2 observations.

Next, Mr. Henne presented the Air Quality Modelling Evaluation International Initiative (AQMEII) 2. AQMEII aims at promoting research on regional air quality model evaluation across the European and North American atmospheric modelling communities through the exchange of information on practices, the realization of inter-community activities and the identification of research priorities, focusing on policy needs. He showed results of evaluations with surface observations, in particular of ozone in Europe. He also showed comparisons of results for chemistry mechanisms, PM_{10} and the impact of boundary conditions.

Mr. Henne shortly presented the evaluation within the MACC regional AQ forecasts and the advantages of model ensembles and data assimilation.

Finally, he showed a variety of applications for CTM and COSMO-ART in particular, which include:

- Nitrate Aerosol Trends in Switzerland;
- NOx Emission Changes;
- NOx and Nitrate Reductions;
- Operational Dust Forecasts;
- Volcanic Ash transport;
- Pollen Forecast.

He concluded that even though CTM can provide versatile applications for air quality assessment there are still some major shortcomings, including an underestimation of high O_3 levels and large differences between observed and modelled PM.

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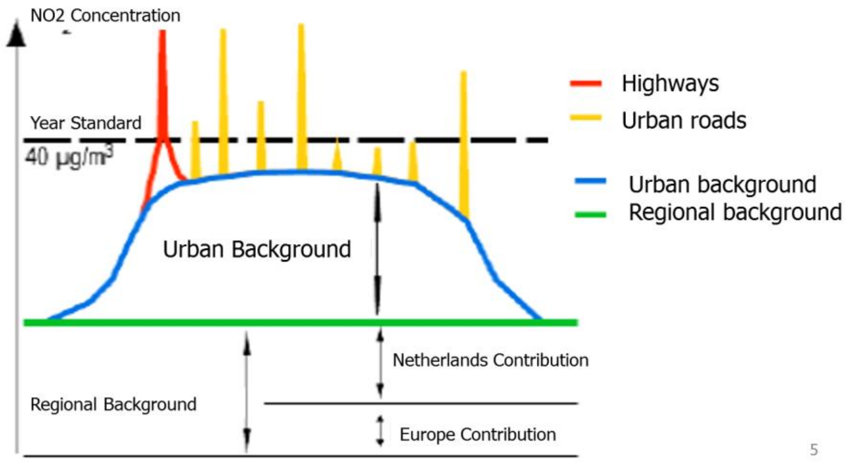
Modelling Air Quality Levels in the Netherlands – Ewald Korevaar

Mr. Korevaar works for Mobilisation for the Environment, a company that offers services in a broad range of disciplines in the fields of environmental management and institutional development. In the Netherlands, they are involved in several court procedures related to spatial planning, environmental permitting and nature permitting. The company has done several AQ modelling projects, such as for the construction of a metro station in Amsterdam, modelling for a court procedure for highway permitting and many more. AQ levels in the country (and in general) have different types of origin, as described by Mr. Korevaar (see graph below):

- Regional Background (sources situated in the Netherlands, and sources situated outside the Netherlands);
- Urban background (highways, other road, industrial facilities, etc.);
- Local Contribution (such as the road itself).



Mr. Korevaar described the advantages of modelling in general and its relation to the Air Quality Directive, but highlighted also the necessity of monitoring for model evaluation, input data and to fulfil the requirements of the Directive.

He described the necessary input data for models and explained in more detail the OPS model. He explained the necessity to calibrate the model and showed several results of model applications. Scenarios for future PM levels were based on assumptions including future economic growth and implementation of various policies.

He concluded that data collection and continuous improvement of input data is an important part of any modelling exercise. As not all data is readily available it is often necessary to make assumptions. Calibration of the model is a necessary step in model calculation and it should be beard in mind that uncertainties are inherent to models. It is also advisable to choose the model that is not too complicated, and it is necessary ~~to do~~to do regular updates.

Modelling air quality on local level and use of modelling for decision making – Mr. Ewald Korevaar

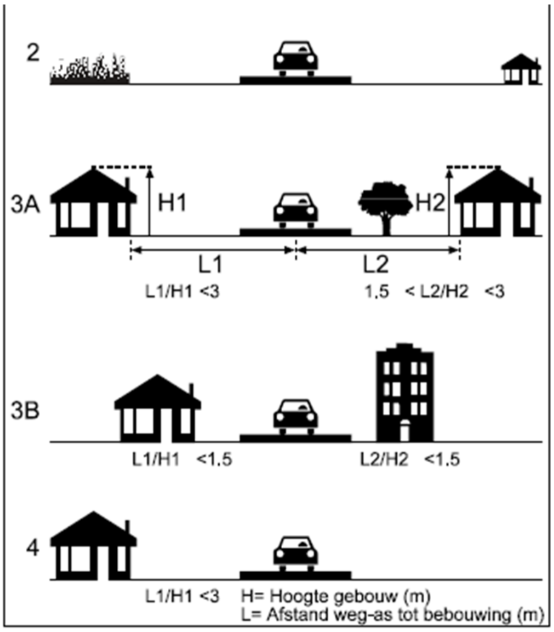
In the previous presentation, Mr. Korevaar focused on determination of the background concentration in the Netherlands. In this presentation he focused more on determination of the local concentration. Two modelling examples were given. Firstly, he showed how pollutant levels decrease with increasing distance from a highway. Secondly, he showed concentration levels in the vicinity of a 60 MW biomass power station. In this scenario, the biggest effect can be expected at about 500 metres from the chimney.

The Dutch law provides 3 Standard Calculation ~~Models for~~Models for Air Quality (SRM – Standaardrekenmethode~~n~~, standard calculation method) for 3 types of situation:

- SRM-1 for streets in an urban environment (also applicable for villages);
- SRM-2 along highways and larger other roads;
- SRM-3 near industrial/agricultural facilities (point/surface sources).

Other models are allowed if the results are comparable to the results of the SRMs or if they can be applied to other situations than specified for the SRMs.

SRM-1 is used for urban areas, predominately cities and villages. Maximum calculation distance is 30/60 meters, with no shielding constructions along the roads, such as noise barriers. The CAR II online program is used for SRM-1, which is annually updated. There are four types of areas defined, according to the relation between the distance to the kerbside and the height of the building, as shown on the picture.



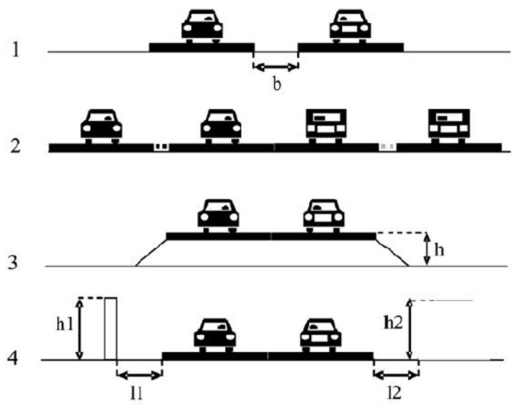
The traffic situations are characterised as following:

- Free-flow traffic / little congestion, average speed 30 - 45 km/h, on average 1.5 stop per kilometre;
- Ordinary urban traffic with some congestion, average speed 15 - 30 km/h, on average 2 stops per kilometre (congestion percentage can be defined for 'fine tuning');

- Congested traffic, average speed less than 15 km/h, on average 10 stops per kilometre.

The one that fits best should be chosen. Emissions belonging to each type of speed characterisation are published every year. Other parameters for calculating emissions include percentage of trucks and lorries, traffic intensity, tree correction (dilution), percentage of congestion, etc. The CAR II online program was demonstrated for an underground parking garage in Amsterdam.

SRM-2 is used for highways and other larger roads. Also, the effects of noise barriers along the road can be calculated. When applying SRM-2, buildings should not be located too close to the roads.



As an example Mr. Korevaar showed model results for ~~an underground parking~~a highway through the City of Amsterdam, for a specific point where a continuous measuring point ~~which~~ ~~was evaluated by~~ of the Amsterdam Health Authority was located. The model results highly underestimated the air quality concentrations with respect to the results of measuring. The underestimation of the model results might be due to:

- Underestimation of vehicle intensity;
- More older cars in Amsterdam than average in the Netherlands;
- Model limitations / imperfections / faults.
- Choice of the wrong model (SRM-2 instead of SRM-1)

The participants performed a small exercise for modelling the impact of a construction of a new metro station and underground parking garage in Amsterdam.

Finally he highlighted possible uses of air quality modelling in preparing air quality plans, for assessing permit applications, within EIA studies and for spatial planning purposes.

Air Quality Inventories in Complex Terrain – Mr. Christian Kurz

Mr. Kurz first of all explained the advantages and purposes of dispersion modelling. Dispersion models in general can be divided in two categories:

- Simple models
  - Need less input data;
  - Are more restricted to certain applications;

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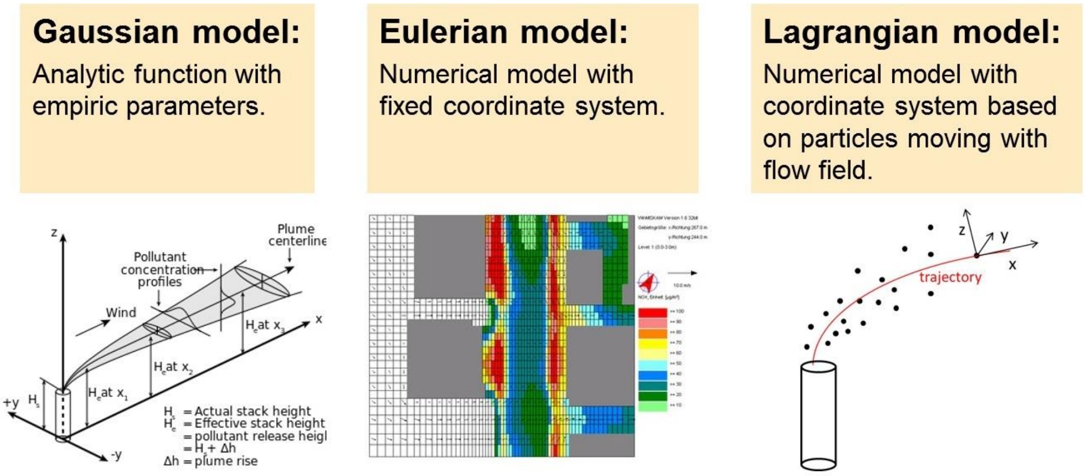
- Complex models
  - Describe the mathematical/physical processes;
  - Need much more input data/

Model uncertainty in general is a product of the quality of the model physics and the quality of the input data. Simple models might have large errors due to simplified model physics but smaller errors due to the input data. Complex models, on the other hand, have better description of the underlying physical processes, but uncertainty might increase due to uncertainties in input data.

There are three types of dispersion models, as described on the picture below.



Mr. Kurz presented a schematic overview of the GRAMM/GRAL model system that was developed at the TU-Graz.

Examples were provided for four different types of applications:

- Point sources;
- Line sources;
- Tunnel portals;
- Air quality inventories.

Mr. Kurz showed in detail air quality inventories that were prepared for Vienna and the city of Salzburg, including the necessary input data, results and validation. He furthermore showed general validation results for the GRAMM/GRAL model system.

Operational Urban Scale Air Quality Forecast System – Mr. Ari Karppinen

The urban AQ forecast system at FMI includes:

- Meteorological and air quality data retrieval;
- Models for emission, chemistry, and dispersion (FORE, CAR-FMI).

Outputs include:

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- 44 hour forecast four times a day (02, 08, 14, and 20 local time);
- NO_2, NO, CO, O_3, $PM_{2.5}$, and PM_{10};
- Domain is the Helsinki metropolitan area (40 km x 30 km; grid size 50-500 m);

Disadvantage of the system is that it only considers traffic emissions. Real time results can be seen on http://uaqfs.fmi.fi/

Mr. Karppinen also described the dispersion and chemistry model (CAR-FMI), which includes:

- Gaussian plume dispersion;
- Dry deposition of particles;
- Discrete parcel method for NO-O_3-NO_2 chemistry;
- Traffic-induced turbulence.

Traffic emission modelling includes both exhaust and non-exhaust emissions.

The road dust emission model (FORE) is based on the PM emission model of SMHI, which considers moisture content of the road surface, and particles from the wear of pavement due to tyres and traction sand. However, it does not include:

- Emissions from brake, tyre, and clutch;
- Dependencies of emissions on vehicle speed or fleet composition;
- Influence of salting, dust binding, ploughing, and cleaning.

Mr. Karppinen showed how regional background air quality is modelled with the SILAM model and the monitoring sites used for model evaluation.

He concluded that the forecasts for $PM_{2.5}$ are fairly good, and for PM_{10} and O_3 moderate. $PM_{2.5}$ is usually over-estimated whereas PM_{10} is underestimated.

Air Quality Forecasting and Assessment – Mr. Ari Karppinen

In a further presentation Mr. Karppinen showed the different scales for which the SILAM model might be used, which goes from the global scale down to about 1-2 km. He also described the various institutions involved in developing the SILAM model system and its users. SILAM can be applied to a variety of applications. He described in more detail European pollen forecast, the modelling of wildland fires, dust from dry areas, emergency preparedness and also modelling of the impact of climate change on air quality. Furthermore he showed the inverse modelling of emission estimates, and data assimilation of volcanic emissions.

China testbed FMI-ENFUSER – Mr. Ari Karppinen

In his presentation Mr. Karppinen described the FMI-ENFUSER model systems (Finnish Meteorological Institute's Environmental information Fusion Service). This model system combines land-use regression and dispersion modelling into a novel approach named as ”dynamic land-use regression”.

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The system has the advantage that a-priori information on emission sources not needed.

Mr. Karppinen showed a testbed setup for the city of Langfang in China. As GIS data was incomplete, FMI used satellite data to fil data gaps.

He summarized that despite the difficulties in obtaining GIS-data a preliminary collection of information has been implemented for environment profiling. A satisfactory amount of pollutant and weather data is available in China and quality will further improve after the addition of PEGASOR data.

Dispersion Modelling – Mr. Ari Karppinen

Mr. Karppinen described how modelling data quality can be improved ~~by integrated~~by integrated use of models, which combine monitoring data, satellite data and model calculation.

He showed that air pollution problems over Europe are different in various parts of Europe and often exhibit complex local and regional meteorology.

He emphasised the difficulties in modelling PM and how PM is model within the FMI model system. Finally he showed different applications of FMI models and described future developments of the model systems.

Dispersion Modelling in Macedonia – Mr. Ari Karppinen

In his final presentation Mr. Karpinnen showed how FMI models were implemented and are applied in the FYR of Macedonia. The dispersion modelling system was established as a part of EU funded Twinning projects, which included extensive training on the models. Both regional and local scale models were used:

- Local scale models
    - Traffic (CAR – FMI);
    - Point sources (UDM – FMI);
- Regional scale model (SILAM)
    - Forecasting and assessment.

On local scale a case study was conducted for large point sources in the city of Skopje. NO_2 and SO_2 concentrations were calculated with UDM-FMI model. The following picture shows the annual mean NO2 levels in Skopje.

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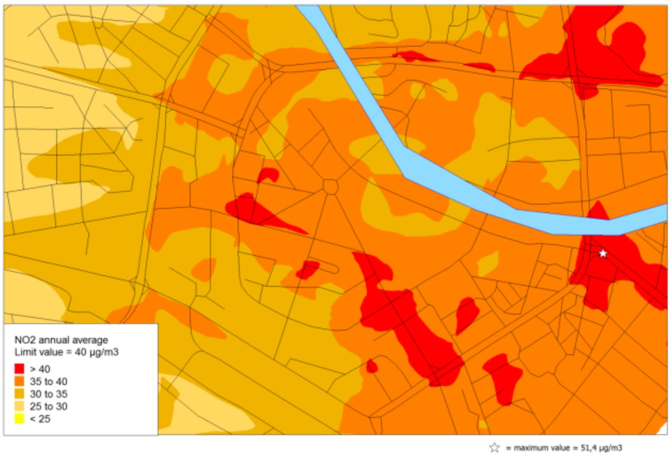

CAR-FMI and UDM-FMI were used to calculate the dispersion of traffic emissions and large point source emissions in Skopje. For traffic, the modelled and monitored concentrations of CO and NO_2 compared quite well, especially for annual averages. For point sources, the modelled SO_2 concentrations were lower than measured. This was expected as not all emission sources were included in the calculations.

Regional scale modelling was done with the SILAM model. Assessment of different emissions scenarios was performed in order to determine the impact of emission reduction measures. A three-day air quality forecast was established, which is available at: http://silam.moepp.gov.mk

Future plans for AQ modelling in FYR of Macedonia include:

- Further training in dispersion modelling provided as a part of ongoing EU funded Twinning project 'Further strengthening the capacities for effective implementation of the acquis in the field of air quality;
- Improvement of emission data for Skopje to include updated data and additional point sources and traffic emission calculation to cover a larger area with updated traffic count data;
- Utilization of modelling results to support the development of air quality improvement plans and programmes in future to assess the impact of air quality improvement measures;
- Utilization of SILAM to support the assessment of the magnitude and duration of air quality episodes;
- Further strengthening the cooperation with institutions providing input data.

Experience in Air Quality Modelling in Republic of ~~Serbia –~~Serbia – Ms. Radojicic

Air quality modelling in Serbia was established under the IPA project Strengthening Administrative Capacities for Implementation of Air Quality Management System SR07IBEN01. This included trainings and workshops for applying the AERMOD model.

For Belgrade SEPA undertook a pilot study on SO_2 modelling. Ms. Radojicic concluded that modelling provided valuable results; however further efforts are needed to improve the hardware and to form a team that includes experts of different disciplines.

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A second pilot study was done for analysing the impact of NO_2 and PM_{10} traffic emissions in Novi Sad with the help of the PROKAS model.

Overall Ms. Radojicic concluded that modelling is an important tool, but further strengthening of human capacities is needed with additional assistance from the EU.

Experience in Air Quality Modelling in ~~Turkey –~~ Turkey – Ms. Funda Filiz

Ms. Filiz presented the current status and future plans for air quality modelling in Turkey. The Marmara region was chosen as a pilot region for modelling within the TÜBITAK-KAMAG project. Part of this project is to develop emission factors that are specific for Turkey based on emission factors taken from the EMEP/EEA guidebook. Modelling is done with the help of the WRF-CMAQ model system, which was developed in the USA. Until 2016 model results will be available for all cities in the Marmara region, further regions will be analysed in future years.

For EIA Turkey uses the AERMOD model. Staff is currently trained to implement a chemical transport model, which covers the whole of Turkey.

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VI. Evaluation

Statistical information

1.1	Workshop Session	Workshop on air quality modelling, 2nd annual working group meeting 20-21 October 2015, Ankara, Turkey
1.2	Facilitators name	As per agenda
1.3	Name and Surname of Participants (evaluators) optional	As per participants' list

Your Expectations

Please indicate to what extent specific expectations were met, or not met:

My Expectations	My expectations were met		
	Fully	Partially	Not at all
1. Improved understanding of the possibilities and limitations of air quality models.	IIIII IIIII (56%)	IIIII III (44%)	
2. Improved understanding of the required input and infrastructure.	IIIII IIIII I (61%)	IIIII II (39%)	
3. Improved understanding of the accompanying costs	IIIII III (44%)	IIIII IIIII (56%)	
4. Exchange of information on the topics described above between ECRAN countries and European Member States.	IIIII IIIII II (67%)	IIIII I (33%)	

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human dynamics public sector consulting

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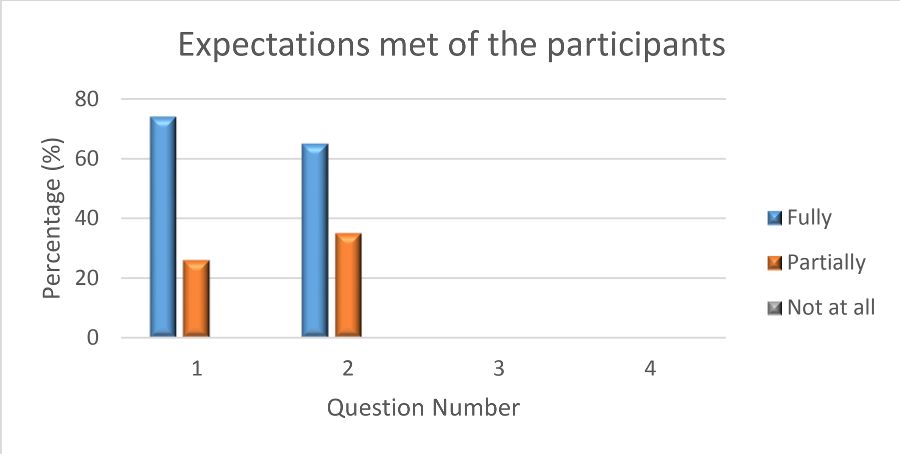

Workshop and Presentation

Please rate the following statements in respect of this training module:

Aspect of Workshop	Excellent	Good	Average	Acceptable	Poor	Unacceptable
1. The workshop achieved the objectives set	IIIII I (33%)	IIIII IIII (50%)	III (17%)			
2. The quality of the workshop was of a high standard	IIII (25%)	IIIII IIIII (63%)	I (6%)	I (6%)		
3. The content of the workshop was well suited to my level of understanding and experience	IIIII II (39%)	IIIII II (39%)	III (17%)	I (5%)		
4. The practical work was relevant and informative	IIIII I (43%)	IIIII (36%)	II (14%)		I (7%)	
5. The workshop was interactive	IIIII IIII (56%)	IIIII I (38%)			I (6%)	
6. Facilitators were well prepared and knowledgeable on the subject matter	IIIII III (50%)	IIIII III (50%)				
7. The duration of this workshop was neither too long nor too short	IIIII (28%)	IIIII IIIII I (61%)	II (11%)			
8. The logistical arrangements (venue, refreshments, equipment) were satisfactory	IIIII IIII (56%)	IIIII (31%)	II (13%)			
9. Attending this workshop was time well spent	IIIII III (44%)	IIIII IIII (50%)	I (6%)			

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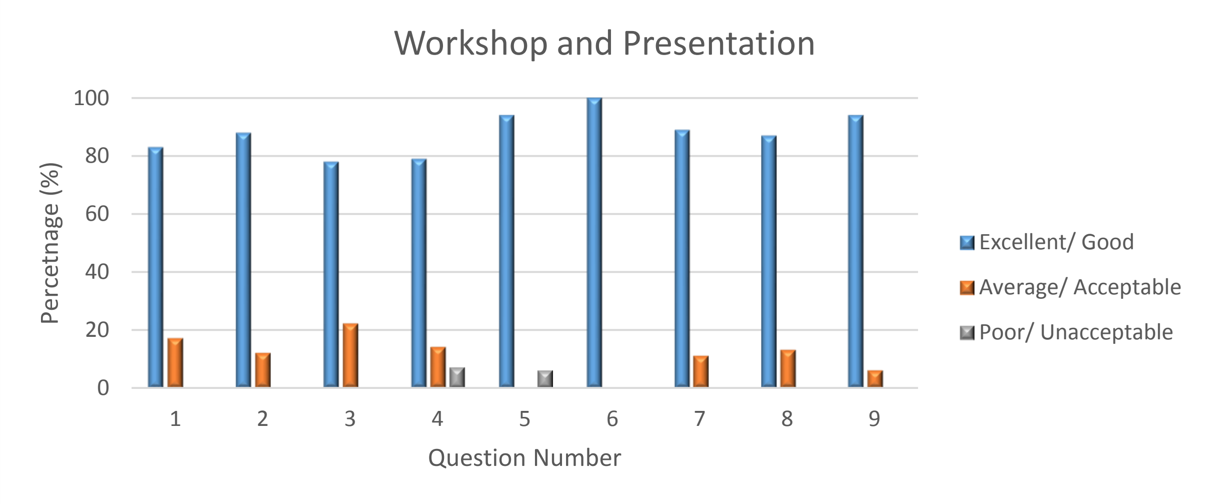

Comments and suggestions

I have the following comment and/or suggestions in addition to questions already answered:

Workshop Sessions:

- At the session of ECRAN countries, where all countries presented the situation of their country, i asked to the organisations to help my country to assist with experts on the field (in the office). The models are different, but to be used we need data. We have to build emission inventories and offer that to model AQ for planning.

Facilitators:

-

Workshop level and content:

- Very good.

ANNEX I – Agenda

Day 1 : 20 October 2015, Ankara

Topic: Annual ECRAN Activity 2.5 Air Quality meeting

Chair and Co-Chairs: Christian Nagl

Venue: Ankara, Ankara Plaza Hotel

Start	Finish	Topic	Speaker	Sub topic/Content	#
08:30	**09:00**	**Registration**			
09:00	09:15	Welcome and opening	Mr. Andrzej Januszewski European Commission, DG Environment	Welcome, introduction of trainers, introduction of participants	
9:15	9:30	Introduction	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Introduction to the purpose of the annual WG meeting and its expected outcome	01
9:30	9:45	Results of the questionnaire	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Overview on the results of the questionnaire sent out to the beneficiary on the impact of ECRAN	02
9:45	10:00	Situation of air monitoring in Albania	Aspri Kapo, Gjystina Fusha		03
10:00	10:15	Air Quality Management in Montenegro	Ms. Gordana Djukanovic		04
10:15	10:30	Air Quality in Republic of Serbia	Ms. Dusica Radojicic		05
10:30	10:45	Air Quality Studies in Turkey	Ms. Funda FİLİZ		06

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10:45	11:00	***Coffee Break***			
11:00	11:15	Implementation of the AQD (MK)	Ms. Aneta Stefanovska		07
11:15	11:25	Current status of the revision of the EU AQ policy	Mr. Christian Nagl, ECRAN, Air Quality coordinator		08
11:30	11:40	Discussion on future activities under ECRAN	all		
11:40	11:50	Discussion on the content of a training manual	all		
11:50	12:00	Summary, outlook, adoption of the workplan	Mr. Christian Nagl, ECRAN, Air Quality coordinator		
12:00	**13:00**	***Lunch Break***			
Topic: Air quality modelling workshop day 1 **Chair and Co-Chairs:** **Venue: Ankara, Ankara Plaza Hotel**					
13:00	13:10	Introduction	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Introduction to the purpose of the AQ modelling workshop, the invited experts and its expected outcome	
13:10	13:20	Results of the questionnaire	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Evaluation of the responses to the questionnaire submitted to the beneficiaries	01
13:20	13:40	AQ modelling: European perspective	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Overview on European initiatives (MACC, FAIRMODE,…), quality criteria according to the Air Quality Directive	02

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13:40	14:30	Copernicus Atmosphere monitoring service	Mr. Ari Karppinen, FMI, Finland	Regional scale air Quality modelling, with special emphasis to FMI-SILAM modelling	03
14:30	14:45	Discussion			
14:45	15:00	***Coffee Break***			
15:00	15:50	Regional modelling: Concepts & challenges	Mr. Stephan Henne, EMPA, Switzerland (via remote)	General information on regional scale chemical transport model	04
15:50	16:00	Discussion			
16:00	16:50	Regional modelling: Evaluation & application	Mr. Stephan Henne, EMPA, Switzerland (via remote)	Examples of applications of regional chemical transport models	05
16:50	17:10	Discussion			

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Day 2 : 21 October 2015, Ankara

Topic: Air quality modelling workshop day 2

Chair and Co-Chairs:

Venue: Ankara, Ankara Plaza Hotel

Start	Finish	Topic	Speaker	Sub topic/Content	#
08:30	**09:00**	**Registration**			
9:00	9:10	Introduction to the 2nd day	Mr. Christian Nagl, ECRAN, Air Quality coordinator	Introduction to day 2 of the workshop	
9:10	10:00	Modelling air quality levels in the Netherlands (regional/local)	Mr. Ewald Korevaar, MOBilisation for the Environment, The Netherlands	Introduction how the air quality levels for NO_2, PM_{10} and $PM_{2.5}$ are determined in the Netherlands on a regional and a local scale	06
10:10	11:00	Using air quality modelling for decision making	Mr. Ewald Korevaar, MOBilisation for the Environment, The Netherlands	How to use air quality modelling for environmental permitting, spatial planning, EIAs and air quality plans	07
11:00	11:10	Discussion			
11:10	11:30	***Coffee Break***			
11:30	12:20	Air quality inventories in complex terrain	Mr. Christian Kurz, Technical University Graz, Austria	Requirements for dispersion modelling in complex terrain and results of air quality inventories in Vienna and Salzburg	08
12:20	12:30	Discussion			
12:30	13:30	***Lunch Break***			

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13:30	14:20	Two different approaches for downscaling the air quality model results from regional to local scale	Mr. Ari Karppinen, FMI, Finland	Connecting local scale dispersion models with regionals scale models Fusion of environmental data (FMI-ENFUSER)	09
14:20	14:30	Discussion			
14:30	15:00	Status and future of air quality modelling in Macedonia	Mr. Ari Karppinen, FMI, Finland		10
15:00	15:30	***Coffee Break***			
15:30	16:00	Status and future of air quality modelling in Serbia	Ms. Dusica Radojicic		11
16:00	16:30	Status and future of air quality modelling in Turkey	Ms. Funda Filiz		12
16:30	17:00	General discussion		Ways forward in the beneficiaries, ways to exchange information between countries	
17:00	17:10	Closing	Mr. Christian Nagl, ECRAN, Air Quality coordinator		

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ANNEX II – Participants

First Name	Family Name	Institution Name	Country	Email
Aspri	Kapo	National Environment Agency	Albania	aspri.kapo@akm.gov.al
Gjystina	Fusha	National Environmental Agency	Albania	gjystinafusha@ymail.com
Liljana	Hoxha	Institute of Public Health	Albania	ishp@shendetesia.gov.al
Shpati	Braho	National Environmental Agency	Albania	shpati.braho@akm.gov.al
Enis	Krecinic	Federal Hydrometeorological Institute	Bosnia and Herzegovina	krecinic.e@fhmzbih.gov.ba
Enis	Omercic	Federal Hydrometeorological Institute	Bosnia and Herzegovina	eniso@fhmzbih.gov.ba
Flutra	Morina	Ministry of Environment and Spatial Planning	Kosovo*	Flutra.morina@rks-gov.net; flutrapula@gmail.com
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ANNEX III – Presentations (under separate cover)

Presentations can be downloaded from:

http://www.ecranetwork.org/Files/AirQ_WS_and_2nd_AM_Presentations_October_2015_Ankara.zip

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ANNEX IV - Questionnaire

Activity 2.5 Air Quality Working Group

Task 2.5.1 Organisation of the Annual Working Group meeting

CAPACITY BUILDING IN IMPLEMENTATION OF EU AIR QUALITY LEGISLATION

IMPACT ACHIEVED THROUGH WORKSHOPS QUESTIONNAIRE

The present questionnaire aims at assessing the impact of the two workshops held so far under activity 2.5.2 on the air quality Directive and the NEC Directive. The main objective of this questionnaire is to discuss the impact during the annual WG meeting in structured way.

You are encouraged to respond to all questions and to provide comprehensive answers including details of any support required. This will enable us to develop specific missions and the training manual that will match with the needs and priorities of your respective administration.

Contact

For questions regarding this questionnaire and for submitting your answers please contact:

Dr. Christian Nagl

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Air Pollution Control, Buildings & Registries

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Deadline

Please return the questionnaire to Christian Nagl until 9 October 2015.

Respondent

Respondent(s))	
Name	
Address	
Institution	
E-mail address	

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1. Regional Workshop on the Air Quality Directive

Podgorica, 29 September - 1 October 2014

Please provide your input in the **white** cells and **replace the text in italic** by your specific input

1.1 Background: The status of the implementation of the Air Quality Directive in your country		
1.1.1	Please describe the status of the implementation of the Air Quality Directive and the 4th Daughter Directive in your national legislation	*Please describe*
1.1.2	Please describe the main problems with respect to air quality assessment	*Please describe*
1.1.3	Please describe the main problems with respect to air quality management	*Please describe*
1.1.4	Please describe the main achievements concerning air quality assessment since the workshop	*Please describe*
1.1.5	Please describe the main achievements concerning air quality management since the workshop	*Please describe*
1.2 Impact: Assessment of the impact of the workshop		
1.2.1	Did you disseminate the presentations, discussions and results of the workshop within your agency?	*yes / no*
1.2.2	Did you download the presentations from the ECRAN website?	*yes / no*
1.2.3	Did the workshop facilitate the implementation of the air quality directive in your country? If yes in what way?	*Please describe*
1.2.4	Did the workshop facilitate the assessment and management of air quality in your country? If yes in what way?	*Please describe*
1.2.5	Which of the topics was the most valuable one for your work?	*Please describe*
1.2.6	Which of the presentations was the most valuable one for your work?	*Please describe*
1.2.7	What would be the most important follow up activity?	*Please describe*

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1.2.8	Did the workshop foster an exchange between you and further ECRAN countries?	*Please describe*
1.2.9	Any further recommendations and / or comment?	*Descriptive text*

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2. Regional Workshop on the NEC Directive

2.1 Background: The status of the implementation of the NEC Directive in your country		
2.1.1	Please describe the status of the implementation of the NEC Directive in your national legislation	*Please describe*
2.1.2	Please describe the main problems with respect to the implementation of the NEC directive	*Please describe*
2.1.5	Please describe the main achievements concerning the implementation of the NEC Directive since the workshop	*Please describe*
2.2 Impact: Assessment of the impact of the workshop		
2.2.1	Did you disseminate the presentations, discussions and results of the workshop within your agency?	*yes / no*
2.2.2	Did you download the presentations from the ECRAN website?	*yes / no*
2.2.3	Did the workshop facilitate the implementation of the NEC Directive in your country? If yes in what way?	*Please describe*
2.2.5	Which of the topics was the most valuable one for your work?	*Please describe*
2.2.6	Which of the presentations was the most valuable one for your work?	*Please describe*
2.2.7	What would be the most important follow up activity?	*Please describe*
2.2.8	Did the workshop foster an exchange between you and further ECRAN countries?	*Please describe*
2.2.9	Any further recommendations and / or comment?	*Descriptive text*

3. Further Suggestions

3.1	Are there any further suggestions you would like to convey?	*Descriptive text*

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