



AirMonTech



Air Quality Monitoring Technologies for Urban Areas 2010 -2013

Thomas Kuhlbusch and the AirMonTech Consortium
3rd AirMonTech Workshop
Duisburg, 04-05/03/2013



www.airmontech.eu

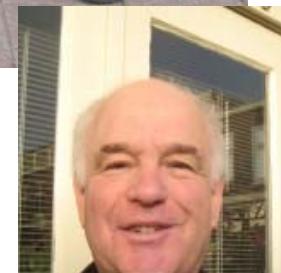


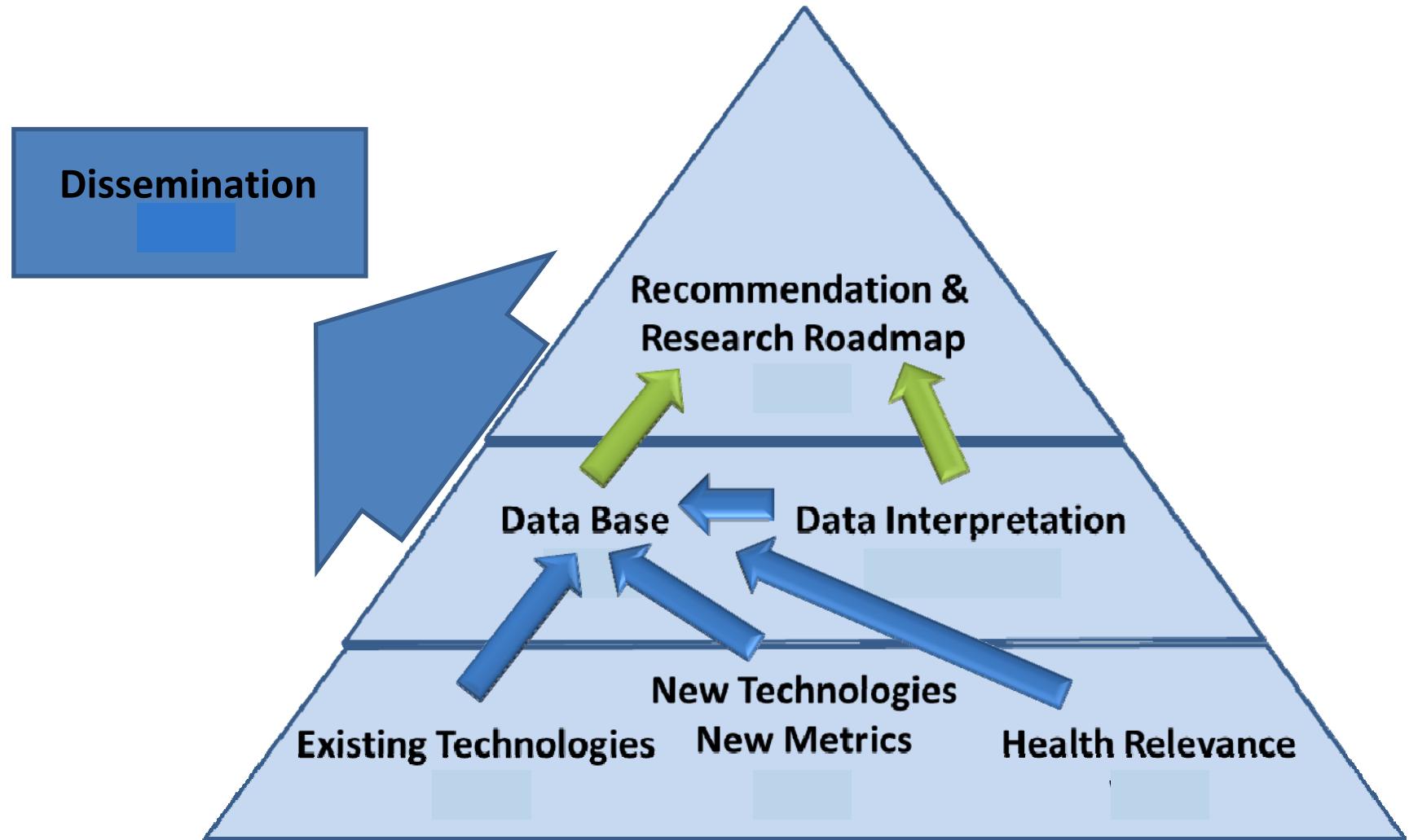
Air Pollution Monitoring Technologies
for Urban Areas

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Welcome







Air Pollution Monitoring Technologies
for Urban Areas

Main Aims



- Review of current online measurement technologies for urban air quality
- Implementation of an up-to-date information base on metrics and technologies

Three basic information sheets for each metric:

- Metric Basic Information (MBI)
 - Definitions, sources (briefly), health relevance, regulations, standard methods, references
- Metric Measurement Technology Overview (MMTO)
 - Table listing all identified monitoring methods, typical operational characteristics, applicability to remote/rural/urban site monitoring
- Metric Measurement Technology Information (MMTI)
 - More detailed description for each methodology listed in the MMTO document



Example for MBI-File



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Background-Information-on-Air-Pollutants-and-Air-Quality-Metrics

Pollutant-Type: → GaseousPollutants¶

Pollutant-Name: → NitrogenDioxide(NO2)¶

Description-of-the-metric¶

Nitrogen dioxide (NO2) is an important gaseous air pollutant as it is directly linked with a number of adverse effects on human health (see below). In addition, NO2 plays an important role in the formation of tropospheric ozone (O3) and is a precursor of nitrates which contribute to atmospheric fine particulate matter. As other N-compounds it contributes also to the eutrophication of soils and waters.¶

Definition, sources

The most important emission sector for NO₂ in Europe is transportation followed by combustion in power plants and industry. Commercial, residential and other stationary combustion sources and agricultural activities are other important sources of NO_x (see EMEP emission data, available from <http://www.emep-emission.at/emissiondata-webdb>). ¶

Concentrations of NO₂ are usually reported in µg/m³ using the respective molar masses of 46 g/mol. Concentrations are reported with reference to standard pressure of 101,3 hPa and standard temperature of 293 K. ¶

HealthRelevance¶

Adverse health effects of ambient NO₂ have been reported through many epidemiological studies. Many studies report short-term respiratory effects including the increase of respiratory symptoms, asthma exacerbations in children and adults, and increases in related emergency visits and admissions as well as respiratory mortality (Anderson et al 1997, 1998; Sunyer et al 1997; Katsouyanni et al 2001; Stieb et al 2002; Galan et al 2003; Paul et al 2005; Camphausen et al 2006; Chiu et al 2011; Trasmatzis et al 2011; Mann et al. 2011; Metzger et al 2011). There is evidence that NO₂ may induce changes in the cardiovascular system in children (Metzger et al 2011), lung function decrements in children (Gauderman et al 2004) and adults (Schindler et al 1998), cardiac autonomic dysfunction (Felber-Dietrich et al 2008) and mortality (Hoek et al 2002; Natstad 2004; Filleul et al 2005) but the results across studies are not consistent (Forastiere et al 2006). ¶

Health effects

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Background-Information-on-Air-Pollutants-and-Air-Quality-Metrics

In spite of the evidence, there is skepticism on whether the NO₂ health effects are causal or are reflecting effects from other traffic related pollutants and in particular particles with which NO₂ concentrations are highly correlated in time and space. NO₂ results have been more inconsistent compared with the ones reported for particles and are also more dependent on the lag times examined as well as the susceptibility of the population. Evidence from toxicological studies suggests that there are NO₂ effects in animals concerning lung metabolism, amphiphilia like structural changes, lung function, airway inflammation, bronchial hyperresponsiveness and decrease in host defense against pulmonary infections (Becker S, Soukup 1999; Pathmanathan et al 2003; Forastiere et al 2006; Hodgins et al 2010). There is some evidence that NO₂ acts synergistically with ozone or PM_{2.5} from controlled exposure human studies (Gong et al 2005). These can be considered in favor of independent NO₂ effects but most have detected effects at higher than ambient level concentrations. However Kucher et al 2011 demonstrated genotoxicity and DNA alterations at NO₂ exposure of 200 µg/m³ on nasal epithelial cells. ¶

Overview Tox and Epi Studies

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Background-Information-on-Air-Pollutants-and-Air-Quality-Metrics

Regulations

Averaging period		EC-legislation	to be met
One hour	200 µg/m ³ (not to be exceeded more than 18 times in a calendar year)	1 January 2010	
Calendar year	40 µg/m ³	1 January 2010	

Reference method (if applicable)

Ponka A, Bacharova L, Schwartz J, Katsouyanni K. Air pollution and daily admissions for chronic obstructive pulmonary disease in 6 European cities: results from the APHEA project. Eur Respir J 1997; 10:1064-71. ¶

Anderson HR, Fone de Leon A, Bland JM, Bower JS, Emberlin J, Strachan DP. Air pollution, pollen and daily admissions for asthma in London 1987-92. Thorax 1998; 53: 842-48. ¶

Quoted publications

Environ Health Perspect 1997; 105: 614-20. ¶

Chiubello M, Odumur E, Stafoggia M, Galassi C, Bertoli F, Faustini A, Bisanti L, Vigotti MA, Dassi MP, Cerniglaro A, Mallone S, Facchetti B, Minerva S, Simonato L, Forastiere F. Short Term Effects of Nitrogen Dioxide on Mortality and Susceptibility Factors in Ten Italian Cities - the EPIAIR Study. Environ Health Perspect. 2011 May 17. [Epub ahead of print] ¶

Estarlich M, Ballester F, Aguilera, Fernández-Somoano A, Lertxundi A, Uop S, Freire C, Tardón A, Basterrechua M., Sunyer J., Ríos ZC. Residential exposure to outdoor air pollution during pregnancy and anthropometric measures at birth in a multicenter cohort in Spain. Environ Health Perspect. 2011 Sep;119(9):1333-8. ¶

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The Aims of AirMonTech



AirMonTech database
Air pollution monitoring technologies for Urban Areas

HOME SEARCH

Pollutants

at: 10.46.19 << Page 1 of 1 >>

Document type: Metric measurement technology information (MMTI)

Pollutants: CO, O₃, SO₂, NO_x, C₆H₆, NO, NO₂, VOCs, HNO₃, HNO₂

GASES_MultipleComponents_MMTI_TDLAS.pdf (156 KB)

<http://db-airmontech.jrc.ec.europa.eu/>



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Main Aims



- Review of current online measurement technologies for urban air quality
- Implementation of an up-to-date information base on metrics and technologies
- Analysis of the current state of the art
- Development of a research road map and consolidated recommendations

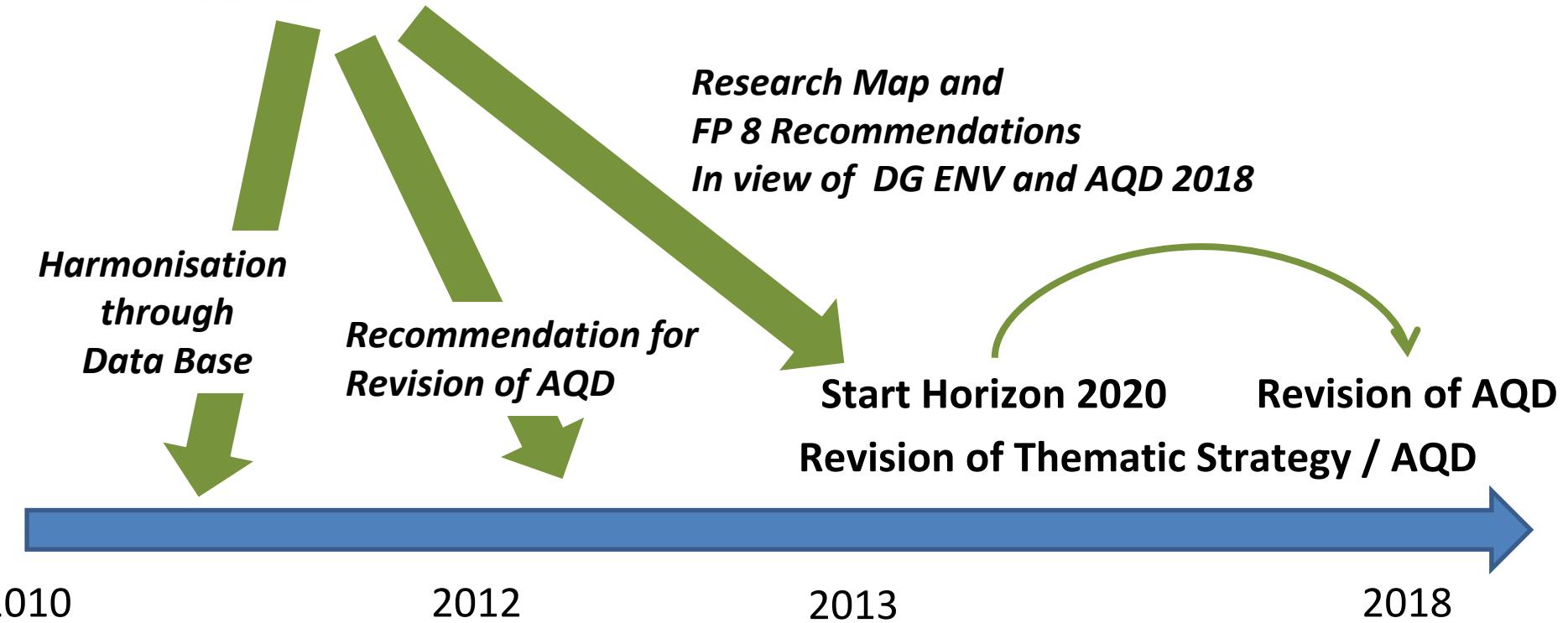


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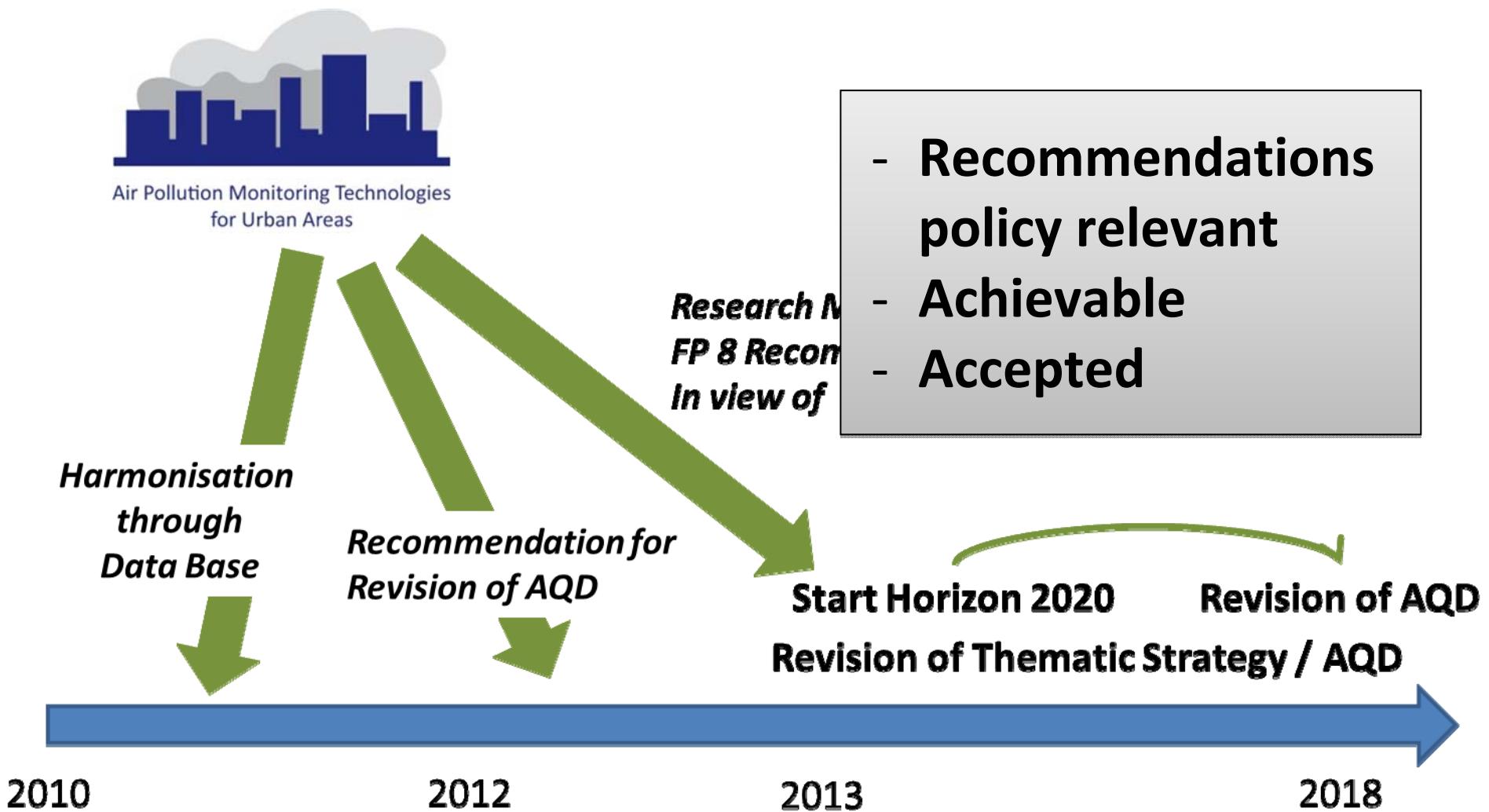
Time line of policy relevant aims



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Time line of policy relevant aims



This Conference

- **1st Session - Monitoring technologies, around now and around the corner**
- **2nd Session - Measuring, modeling, mapping: Urban AQ data everywhere and anytime**
- **3rd Session - Easy regulation, difficult realisation:
Implementing of new approaches into the current monitoring design**
- **4th Session - It's (almost) all about health**
- **5th Session - Towards new horizons (2020 and beyond)**
- **6th Session - COST Action TD1105: EuNetAir environmental case studies from mediterranean, central and eastern Europe**

