European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

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New Sensing Technologies for Air Quality Monitoring

Summary of Research and Innovation Needs from SIG4: Expert Comments for the Revision of the Air Quality EU Directive

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Special Interest Group 4:
Expert Comments for the Revision of the Air Quality Directive

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DIRECTIVE 2008/50/EC: Ambient air quality and cleaner air for Europe

Objectives:

Comments on Revision of Air Quality Directive 2008/50/EC towards the new EC directive by 2018.
Suggestions to be proposed to European Environment Agency.

Activities:

Supporting to the writing of the State-of-Art planned in the Action for environmental monitoring activities related to the Action issues.
Promotion/Definition of EU proposals for funding of new research and innovation in the Action.

2008 Air Quality Directive

Guidelines and requirements for:

- o Air quality measurements
- o Air quality assessment
- o Limit and target values for air pollutants
- o Public information and reporting

OBJECTIVES

- To **protect human health**, paying particular attention to sensitive populations;
- To **minimise harmful effects** on the environment as a whole (ecosystems, vegetation, materials and ozone layer);
- To **prevent air pollution** in advance;
- To **improve the monitoring and assessment** of air quality;
- To **provide information** to the general public.

2008 Air Quality Directive

major goal

to protect human health

BUT

Experts WHO agreed that no “threshold” concentration of PM or O_3 had been identified below which there are no adverse health effects. Therefore, no guideline value can be specified that, if achieved, will fully protect human health!

Urban population exposure

Percentage of the urban population in the EU-28 exposed to air pollutant concentrations above EU/WHO values (2011–2013)

Pollutant	EU reference value	Exposure estimate	WHO AQG	Exposure estimate
$PM_{2.5}$	Year (25)	9–14	Year (10)	87–93
PM_{10}	Day (50)	17–30	Year (20)	61–83
O_3	8-hour (120)	14–15	8-hour (100)	97–98
NO_2	Year (40)	8–12	Year (40)	8–12
BaP	Year (1 ng/m³)	25–28	Year (RL, 0.12 ng/m³)	85–91
SO_2	Day (125)	<1	Day (20)	36–37

Key: < 5% | 5–50% | 50–75% | > 75%

(EEA, 2015 - Air quality in Europe. 2015 report)

- A large proportion of European populations and ecosystems are exposed to air pollution in exceedance of EU/WHO values
- WHO Air Quality Guidelines are stricter than the EU air quality standards!

The EU Clean Air Policy Package

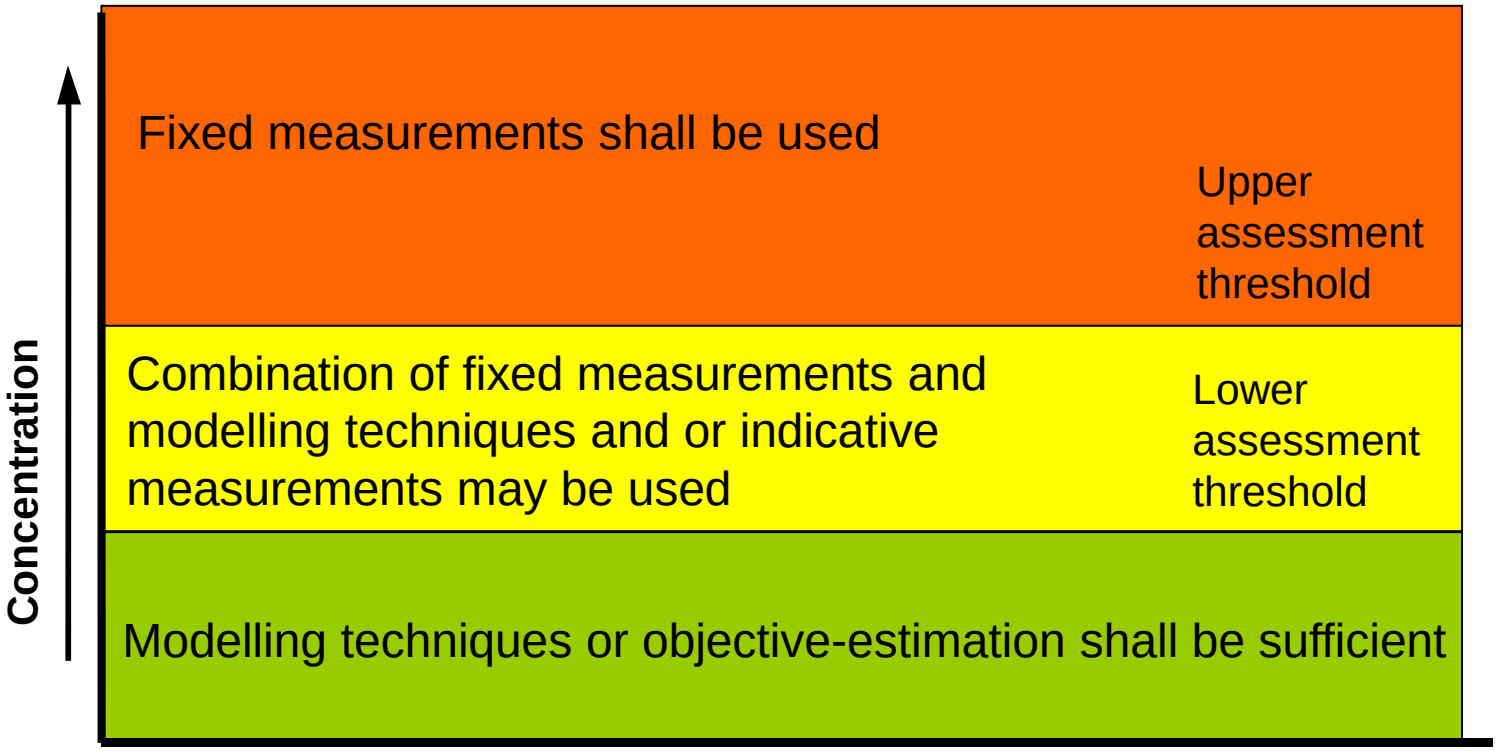
The Commission has adopted the **Clean Air Policy Package** in December 2013, a new Clean Air Programme for Europe:

- new air quality objectives for the period up to **2030**,
- a revised National Emission **Ceilings Directive** with stricter national emission ceilings for the six main pollutants
- a proposal for a new Directive to reduce pollution from **medium-sized combustion installations** (Medium Combustion Plant Directive 2015/2193/EU), 1 to 50 MW, not covered in Large Combustion Plant Directive (LCPD).

Aims to ensure compliance with existing legislation by 2020 and to further improve Europe's air quality by 2030 and thereafter

2008 Air Quality Directive | air quality assessment

Assessment strategy depends on upper and lower assessment thresholds



Those fixed measurements may be supplemented by modelling techniques and/or indicative measurements to provide adequate information on the spatial distribution of the ambient air quality.

SO_2, NO_2, NOx, PM10, PM2.5, Pb, C_6H_6, CO

New Sensing Technologies for Air Quality Monitoring

Sensors can contribute to the AQD

*"Information from fixed networks may be **supplemented** by modelling techniques and/or **indicative measurements** to enable point data to be interpreted in terms of geographical distribution of concentration"*

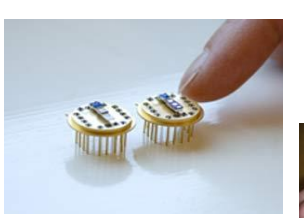
- To supplement fixed data when a zone is in exceedance of the upper assessment threshold.
- In combination with monitoring when a zone is in exceedance of the lower assessment threshold.
- To replace monitoring when a zone is below the lower assessment threshold.

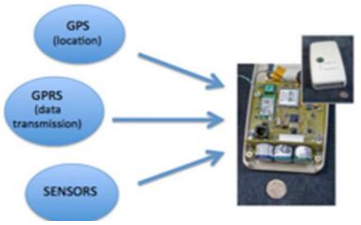
Necessary to ensure reproducibility and assess uncertainty

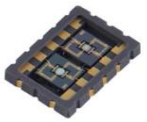
CONCLUSIONS and CHALLENGES

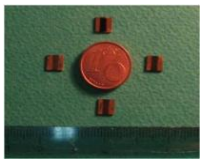
Air Quality Monitoring

- The future challenges for urban air quality monitoring in Europe are to **fill the gaps in information** related to spatial and temporal variations of exposure to health-relevant air pollutant metrics.
- Routine monitoring should **address multiple purposes** e.g. compliance assessment, effectiveness of AQ action plans, routine health monitoring and assessment, and impact assessment.
- **Atmospheric emissions measurement** can be an important issue in coming years, based on the revision of the the National Emission Ceilings **(NEC)** Directive 2001/81/EC (NECD) as part of The Clean Air Policy Package, based on annual capping of national emissions of air pollutants.







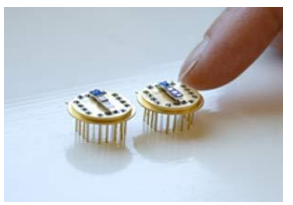


(EC, 2013 - Research Findings in support of the EU Air Quality)

CONCLUSIONS and CHALLENGES

Air Quality Monitoring

- Development of areas for **Research and Monitoring of Air Quality focused on human health** in various densely populated areas in Europe, to enable the development and integration of new measurement technologies, as well as testing new exposure metrics and exposure assessments.
- **Black carbon** is one promising additional air quality parameter to be regulated in revised AQ standards, since there is a high cause-effect relationship with health outcomes (e.g., domestic heating).



(EC, 2013 - Research Findings in support of the EU Air Quality)

CONCLUSIONS and CHALLENGES

Air Quality Monitoring – Ozone

- Improve the monitoring networks, siting criteria and siting density to **address changes** in the observed pollutants **concentration trends** – e.g. Ozone has increased at all background sites in the northern hemisphere in all seasons at approximately 1% per year relative to the site's in 2000 year.

- To develop an overall European strategy for **measuring ozone precursors** and especially VOC is needed. Considerations could be given to have a higher density of measurement of VOC in VOC limited areas, as e.g. in Southern Europe.

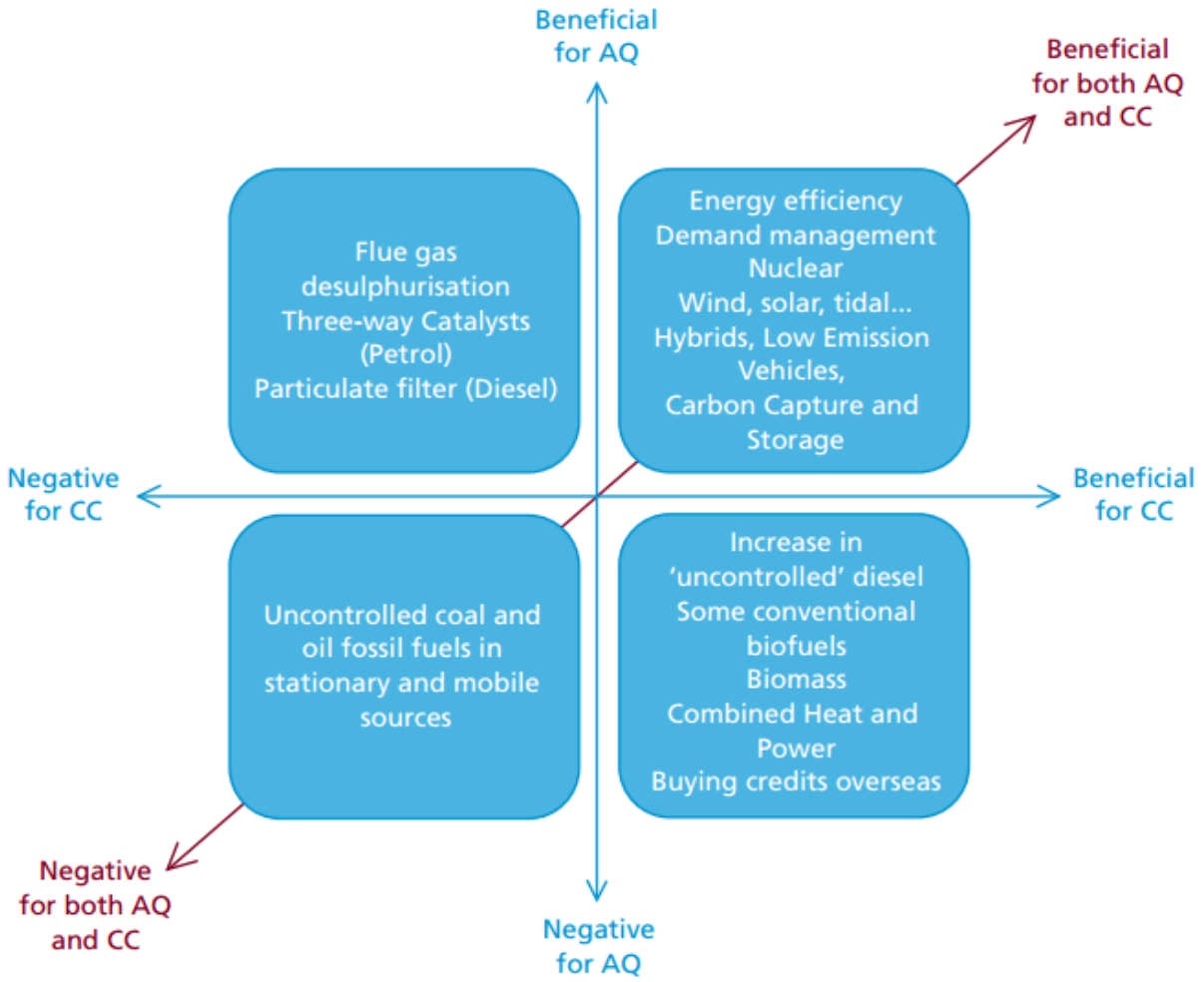
- **Studies on the European** scale are necessary to understand the European ozone trends, which are very much dependent on the chemical regimes, whether it is VOC or NOx sensitive for optimal regulation strategies.

(ECORYS, 2014 - Services to assess the reasons for non-compliance of ozone target value set by Directive 2008/50/EC and potential for air quality improvements in relation to ozone pollution)

CONCLUSIONS and CHALLENGES

Air Quality and Climate

- It is needed **better understanding how climate change**, and mitigation strategies, will affect **future air quality**.
- This is needed to avoid that climate change could make ineffective air quality measures, and to **design climate change mitigation and adaptation strategies** that maximize **co-benefit** for both **air quality and climate**.



(DEFRA, 2010, Air Pollution: Action in a Changing Climate)
(EC, 2013 - Research Findings in support of the EU Air Quality)

Thank you!

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www.ua.pt/idad