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

COST Action TD1105

WGs and MC Meeting at Cambridge, 18-20 December 2013

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year 2: 1 July 2013 - 30 June 2014 (*Ongoing Action*)

Research and Innovation Needs of WG4

Ingrid Bryntse

Function in the Action: WG Leader

SenseAir AB / Sweden

COST is supported by the EU Framework Programme

ESF provides the COST Office through a European Commission contract

Scope of WG4 and EuNetAir

- In Rome (Dec 2012) we discussed the general scope of EuNetAir and decided that we´are aiming at low-cost sensors and in this case the price for the user is below **€100 for small sensor with simple pcb** (OEM manufacturer price to a customer which use in their system) and **€300 for sensor modules**.

- In 2012 we selected some species to start with. We chose the analytes that are believed to either causing severe harm for living beings or being of great importance from an energy saving point of view.

Scientific context and objectives in the Action

Protocols and Standardisation Methods / WG4 in *EuNetAir*

- We will **choose some common analytes** every action year and focus on them
- Certified test laboratories or wellknown universities / institutes will investigate measurement method accuracy and performance **according a general test guideline**
- We will try to establish **common general standards** for modern European sensor / analyzers based on different measurement techniques; focusing on gases, odors and particle detection.

Roadmap for WG4 within *EuNetAir*

WG4 will:

- Summarise the **"state of the art"** of commercially available low cost gas sensors / analyzers.
- Summarise possible and most **common applications** for a certain gas sensor.
- Produce lists of tests **“test protocol”** that should be used in order to validate sensor specifications. These protocols and test results could later be used for creation of modern standards.
- Identify test sites which could be used for field testing of sensors and sensor networks, if *EuNetAir* partners and other companies **(in Europe or elsewhere)** would like to provide sensors.
- Initiate laboratory and field testing at nationally accredited test laboratories. Other labs could be used: Alphasense / Rod Jones at Cambridge for lab / field validation and SenseAir for CO_2 testing. **Time plan and costs for testing are unknown.**

Challenges in Air Quality Control

Updated plan (18 Dec 2013)

WG4 will focus on the following target analytes in 2014:

Odours

- **H_2S and organic thiols (mercaptans)**
- **Action: A state-of-the-art summary of sensors / analyzers will be written by Anne-Claude Romain & John Saffell.**
- **Referees: John Cristoph (AlphaMOS), Thorsten Conrad, Krishna Persaud & Magda Brattoli.**
- **Deadline: June 2014, work will be initiated by John Saffell no later than Jan 2014.**

PM, Particulate Matter

- **PM_{10}, $PM_{2.5}$, ultrafine PM and BC**
- **Action: A state-of-the-art summary of sensors / analyzers will be written by Anita Lloyd Spetz.**
- **Referee & co-author (BC): Grisa Mocnik and John Saffell who will add a table.**
- **Partly finished, new deadline: February 2014.**

Inorganic gases

- **NO_2 nitrogen dioxide & O_3 trioxygen (ozone)**
- **Action: A state-of-the-art summary of sensors / analyzers will be written by Nicolas Moser at SGX**
- **Referees: Members of the EuroMet project MacPoll, Rod Jones and Michel Gerboles.**
- **Deadline: March 2014**

- **CO_2 carbon dioxide (ventilation indicator and greenhouse gas)**
- **Action; A summary of main applications will be written by Ingrid Bryntse at SenseAir.**
- **Referees: Nicolas Moser and John Saffell.**
- **Finished. Add comments about that the technique is understood therefore the report is mostly market focussed.**

VOC in In-door air

- Focussed on **CH_2O methanal (formaldehyde)**
- Action: A state-of-the-art summary of sensors / analyzers will be written by Andreas Schütze or a student together with John Saffell & Nicolas Moser.
- Anne-Claude Romain summarises the VOC issues on one page.
- Referees: Thorsten Conrad & Anita Lloyd Spetz.
- Deadline: June 2014.

Research Goals in Air Quality Control

- **Background / Problem statement:**

After defining the main analysis techniques we suggest that European funding pays **accredited European Laboratories** for evaluating some of the most well-known sensors / analysers that are available on the market.

Also sensor testing might be performed by Tim Watkins (EPA, USA), John Saffell, Rod Jones or in the Environmental Field for **odour monitoring**.

One idea is that testing laboratories can be suggested by a special committee based of *WG4 sub-group leaders* and some other experts in relevant fields.

Priority Innovation Requirements in Air Quality Control

- **Background / Problem statement:**

- **New sensors** developed in Europe should be further developed into products / systems, available on the global market.
- In order to manufacture well-performing sensors or analysers it is necessary to have *automatic calibration* for high-volumes.
- If we want to compete with low-cost manufacturers outside Europe we need as *efficient calibration processes* as possible.
- Calibration should also include *verification using final test stations*.

WGs Recommended Literature in Air Quality Control

- **Background / Problem statement:**

✓ It is not obvious where to find literature about automatic calibration of gas sensors.

✓ Someone within ***EuNetAir*** could write a review about existing **calibration standards for air quality measurement.** Focus on the standards that are used in EU and USA.

Suggestion: Dr. Vivien Bright at Cambridge or any STSM student ?

✓ We identify that there is need of **formulating an European Guideline of calibration methology** for Air Quality Measurements.

CONCLUSIONS

Suggested **R&I Needs** for future research to Action WGs/SIGs General Assembly

- **Calibration Guideline**
- **Testing Protocols**
- **Ultrafine Particle Sensors, Low-cost**

These are **R&I Needs** from a WG4 point of view.

As individual scientists or companies we might have other needs !

We hope that we can find some more < *31 Jan 2014 !*