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

COST Action TD1105

1st EuNetAir Air Quality Joint-Exercise Intercomparison

Sensors versus Analyzers for Air-Pollution Monitoring in Aveiro City

University of Aveiro, Institute for Environment and Development - IDAD

Aveiro, Portugal, 13 - 27 October 2014

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 3: 2014-15 (*Ongoing Action*)

AIR-SENSOR BOX: A Compact Solution for Air Quality Control

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Function in the Action: WG2 Member

ENEA, Brindisi, Italy

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Scientific Context and Objectives

- Detecting and checking effectively **air quality in urban areas** needs a widespread employment of portable and, possibly, **cheap and reliable gas detector systems**

- Main issues to be addressed in order to build sensors and systems for air quality control are: **interfering gas influence, baseline stability, sensitivity, temperature and humidity influence, power consumption and small dimensions (portability)**

Our Attempt to Solve the Problem: *AIR SENSOR BOX*

- **CO-B4 for CO by Alphasense**
- **NO2-B4 for NO$_2$ by Alphasense**
- **SO2-B4 for SO$_2$ by Alphasense**
- **O3-B4 for O$_3$ by Alphasense**
- **Optical PM Counter PPD20V by SHINYEI**
- **Temperature Sensor TC1047A by Microchip**
- **RH Sensor HIH5031 by Honeywell**

23 cm

30 cm

- **Raspberry-Pi based Module**
- **portable and compact equipment**
- **average power consumption: 4W**
- **fully remote operated by GPRS-GSM/LAN networks**
- **real time monitoring and onboard data storage**
- **4 Electrochemical Gas Sensors onboard + Optical PM Counter + RH + Temperature**
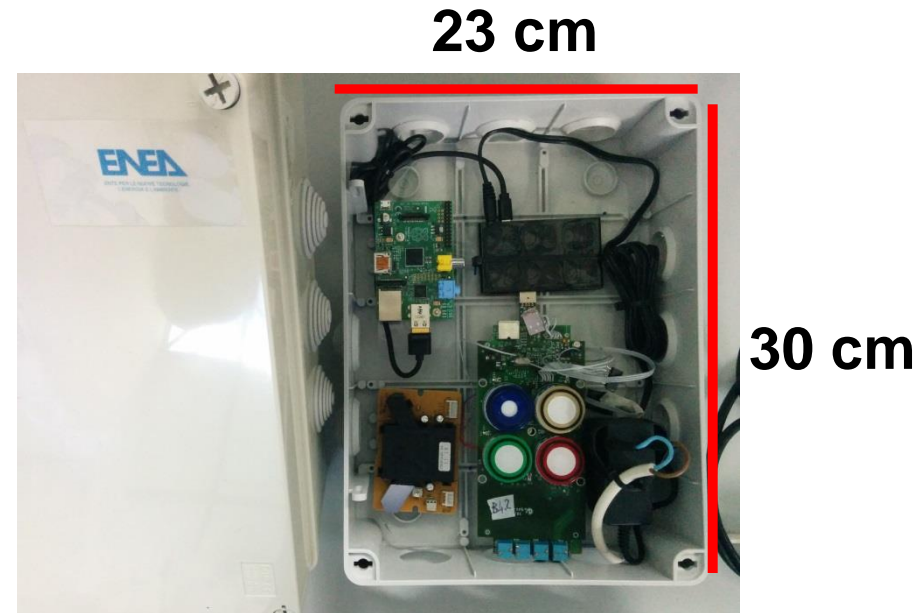
Previous Experiments *versus* Expected Results

- **Expected results**: being in the limits given by the **Data Quality Objectives** (DQO: **EU Air Quality Directive 2008/50/EC**) for *Indicative Measurements*, which are 25% accuracy for our targeted gases: SO_2, NO_2, CO, O_3 and 50% for PM.
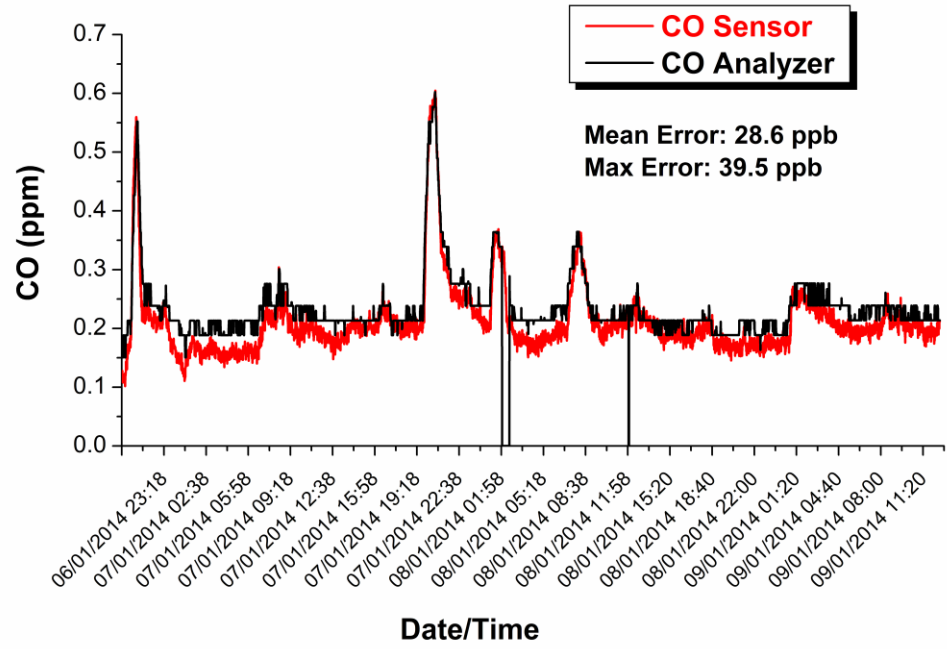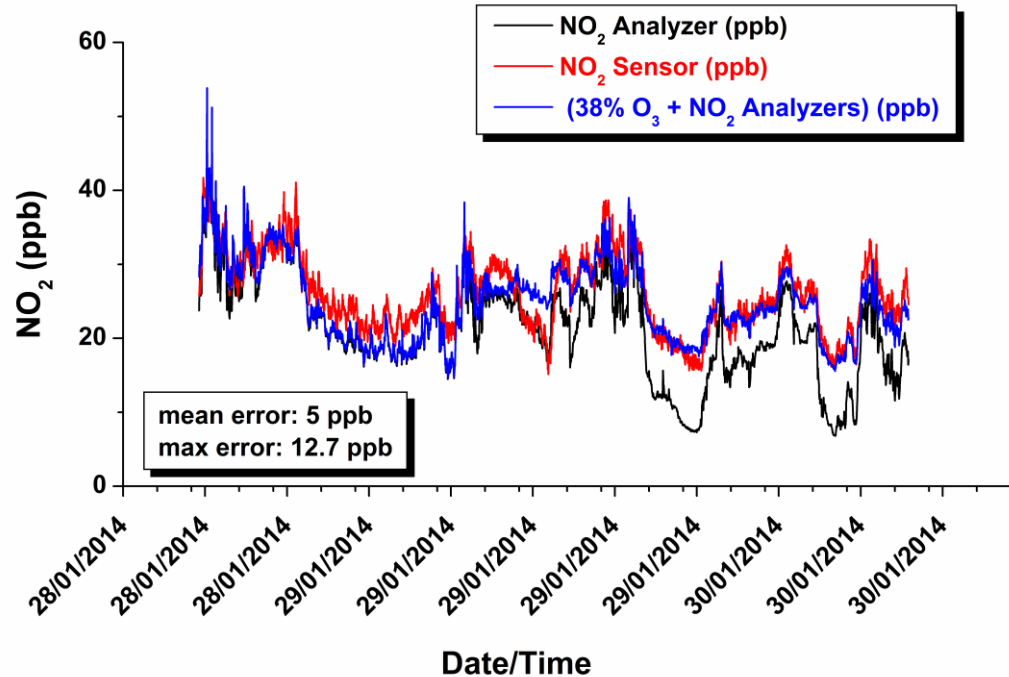
Experiments Main Goals and Open Problems

- **<u>Checking the capability of solid state sensors to try to replace traditional equipment and verifying their perfomance limits.</u>**

- **Checking equipment feature and functionality usefulness.**

- **Comparing performances of traditional analyzers with solid-state sensor responses in terms of mean and maximum error.**

- **What about interfering gases effects ?**

- **What is about stability in real scenario ?**

- **What about correct maintainance (e.g., lifetime, re-calibration) procedures ?**

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ACKNOWLEDGEMENTS: Projects

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- ### CONSORTIUM COST Action TD1105 EuNetAir

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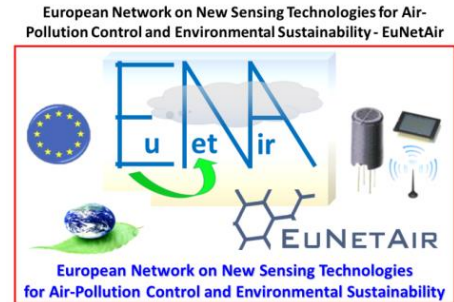
- ### PON1 BAITAH:

Methodology and Instruments of Building Automation and Information Technology for pervasive models of treatment and Aids for domestic Healthcare

- ### PON4a RES-NOVAE:

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