

## **Nanoenvi. Envira's experience with low cost air quality sensors.**

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### 1. SUMMARY:

Envira Sostenible S.A. started in 2009 a line of research & development of a new line of air quality monitors based in low cost sensors.

Since then we worked with different sensors for applications such as detection of pollution episodes, odor monitoring or complementary measurements for reference measurement networks.

### MOTIVATION and RESULTS:

For years, air pollution has been monitored by means of fixed or mobile stations using complex and expensive instruments.

Envira Sostenible S.A. started in 2009 a line of research & development of new measurement systems based on low cost sensor technology.

The purpose of these developments is not to replace the reference instrumentation but complement the regulatory monitoring networks with low cost monitors, easy to install and that can help network managers identify air pollution problems, verify the effectiveness of reduction strategies or validate models in places where traditional measurements are not possible.

As a result of these process we develop the Nanoenvi Monitor.

The Nanoenvi monitor uses a combination of sensors of different technologies (electrochemical cells, PID's, metal oxides or laser scattering).

The electronics converts changes of electrical properties in the cell into concentration, compensating the variations that take place by changes in the temperature and humidity.

A small pump draws the air at a fixed and constant flow, that increased the reproducibility of measurement in comparison with passive systems.

The analyzer has a powerful internal datalogger developed by our company.

This datalogger allows the connection of up to 4 sensors of polluting agents and 8 analog inputs for other types of sensors.

The data storage is made in a MicroSD card, with capacity of up to 8 Gb, which confers an autonomy of more than 4 years of hourly data.

Some of the applications of these systems are:

- City Sensor Networks to improve air quality
- Response to industrial accidents.
- Fence line monitoring
- Odor detection and mitigation.

However, the limitations of low cost sensors technology must be taken into account and results must be analysed carefully to avoid false readings:

- Cross interferences. Sensors normally are not pollutant specific and sometime response to the presence of other pollutants is not negligible.
- Temperature effects in electrochemical cell is important for low concentrations.
- Humidity artefacts in optical PM monitors
- Wind effects in passive systems.
- Memory effect

## **Conclusions**

These kind of sensors are quite promising for a near future, technology is improving a lot in last years, but they must be used carefully and a case by case analysis should be necessary.

FIGURES :