RESCATAME - Pervasive Air-quality Sensors Network for an Environmental Friendly Urban Traffic Management
LIFE08 ENV/E/000107

Project description

Environmental issues

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Project description:

Background

Air pollution remains a serious cause for concern in Europe. High pollution levels have a significant adverse effect on human health and on the environment, particularly in urban agglomerations where traffic emissions are high. A recent study carried out by the Observatory of Sustainability in Spain (OSE) on air quality in cities shows that living in cities with high levels of pollution reduces life expectancy from a few months to two years, as well as increasing the risk of respiratory diseases. The air quality in cities in Spain is far from satisfactory. The design of cities (width and orientation of streets) must be considered, as it can have a major influence on the dispersion of pollutants. In areas with pollution levels well above average, the flow of traffic and direction, especially during rush hours, is of major importance. In some cities, exhaust from cars is largest source of air pollution. As a result, legislation has been introduced to control more and more types of pollutants and reduce the allowable limits.

Objectives

The main objective of the RESCATAME project was to introduce the sustainable management of traffic in the city of Salamanca by establishing an air-quality sensors network and the use of prediction models. This objective would be achieved through the technological development and practical application of the ‘instrumented city’ concept, which has already been developed at pilot level in
the United Kingdom in recent years. Such development will help to define a new Urban Traffic Management and Control Strategy (UTMC), based on prevention of regular high pollution episodes caused by urban traffic. The purpose of integrating management needs in the areas of mobility and air quality into a single urban traffic management model is not only necessary to achieve the goal of reducing pollution levels below the limits imposed by the European Directives. It is also absolutely essential to organise the city traffic in a rational manner without causing excessive disruption to the mobility needs of citizens and to achieve sustainable traffic levels at any time.

The ‘instrumented city’ concept allows traffic and pollution data to be analysed to produce pollution predictions in real time. It also allows local authorities to calculate the effects of various scenarios of traffic regulation and to compare the impact of the selected scenario on pollution at ‘hotspots’ with new data collected by the same measurement instruments. Thus, the pollution results enable traffic control measures to be fine tuned in real time.

Results

The RESCATAME project demonstrated the practical application of a new system for sustainable traffic management that installs a network of multi-sensors placed at critical pollution points and models that predict pollution levels, which may help to take early actions in order to manage the urban air pollution and ensure sustainable mobility in a city.

Sensors were installed at 35 points on two streets of Salamanca, each point equipped with seven sensors to measure the following parameters: carbon monoxide (CO), nitrogen oxides (NOx), ozone (O3), fine particles (PM), noise, humidity and temperature. The two streets were selected from the 24 problematic areas of Salamanca with major traffic flows, taking into account the impact they could have on the overall level of emissions in the city: C. Álvaro Gil (250 meters long/10 posts) and Avda. Los Cipreses (750 meters long /25 posts).

These multi-sensors are used to assess the pollution to monitor and control traffic. The transmission system was carried out using a Meshlium placed at the traffic lights located in the middle of both of the two selected streets. Data was collected in real time over a year at regular 10 minute intervals; more than two million bits of data were gathered and processed. Based on this information, the prediction models estimate the value that each contaminant could reach in the next hour and in three hours, allowing the traffic department to foresee high pollution episodes and act accordingly. The department can thus guarantee that the pollution levels are not surpassed by, for example, changes in the timing of the traffic lights, temporary blocking of a lane, traffic regulations imposed by local police officers, among other factors. These models also allow the effects of various scenarios/alternatives of traffic regulation to be calculated in order to support decision makers.

The performance of the system implemented met very strict requirements concerning the parameters monitored, operation autonomy, data transmission speed, visual impact of the system and protection from vandals. The system demonstrated how pollution can be reduced to the Municipality of Salamanca, its local citizens and all third parties involved/interested in the developed
methodology and technology. Moreover, the project developed an innovative technology: the multi-sensors were not previously available on the market, and the team applied for a patent for them. Also, the project constructed posts for the sensors, instead of hanging them on street lamps or traffic lights. The advantage of this arrangement is to increase the protection against possible vandalism, facilitate the installation of the photovoltaic panel that powered the system and analyse air at the height of the average person’s nose (and thus assess the actual concentration of a contaminant that a pedestrian is breathing).

Furthermore, the project represents the first full-scale implementation of the system in a city. The system is very versatile and can be adapted to different spatial scales (national, regional, urban and road traffic), sectors, environments and types of pollutants. Moreover, the technology is less expensive than traditional systems for measuring air pollution. Indeed, the beneficiary is planning to develop a marketable prototype by modifying those aspects that were assessed as ‘weak points’ in this project. It received many business offers during the project.

Even after the end of the project, the multi-sensors network is still being used in the two streets studied. The Municipality of Salamanca planned to closely monitor the information provided by the system until the end of 2013 and assess the possibility of expanding the system to other streets. The system developed is fully reproducible, regardless of the size of the area to be covered.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).

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Environmental issues addressed:

Themes

Air & Noise - Air quality monitoring
Risk management - Human health protection
Land-use & Planning - Transport planning - Traffic monitoring

Keywords

air quality monitoring, human exposure to pollutants, urban area, air pollution

Natura 2000 sites

Not applicable
Beneficiaries:

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Read more:

Newsletter
Title: "Clean, Clever, Competitive Eco-innovation for a sustainable future: Eco-innovation offers opportunity in emerging markets" (2.33 MB) Year: 2011
Editor: Eco-innovation action plan
No of pages: 4

Project web site: Project's website

Publication: After-LIFE Communication Plan
Title: After-LIFE Communication Plan
Year: 2012
No of pages: 22

Publication: Article-Paper
Title: "Proyecto Rescatame: Nueva estrategia de gestion y control de la contaminacion generada por el trafico urbano" (145 KB) Author: CARTIF
Year: 2011
Editor: Revista Dyna
No of pages: 2

Publication: Article-Paper
Title: "Proyecto RESCATAME: Nueva estrategia de gestion y control de la contaminacion generada por el trafico urbano IN: Colaboracion" (979 KB) Author: Dolores Hidalgo, Marta Gómez, Rubén Irusta, ...
Editor: CARTIF Centro Tecnológico
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