



LIFE MINOX-STREET - Monitoring and modelling NO_x removal efficiency of photocatalytic materials: A STRategy for urban air quality managEmEnT

LIFE12 ENV/ES/000280



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Project description:

Background

Air pollution linked to the road transport sector is still one of the main environmental problems in European cities. The negative impact on human health has been widely demonstrated, and the improvement of air quality in highly populated areas is a policy priority. The EU Directive 2008/30/CE defines European air quality standards and seeks to protect public health by establishing limits for certain pollutants.

Road traffic is the main source of nitrogen oxides (NO_x) pollutants. In the Madrid urban area and the Henares corridor, NO₂ limits are frequently surpassed in the October to February period. In order to reduce this pollution, different strategies have been implemented and tested. One emerging solution is the use of building materials incorporating photo-catalytic substances, such as titanium dioxide (TiO₂), which, when activated by solar radiation, eliminate these pollutants by means of photo-catalytic reactions. This research has led to the commercialisation of several building materials.

Objectives

The Project 'MINOX-STREET' is set within the framework of the 'Thematic Strategy on Air Pollution' (COM(2005)446), which aims to attain "levels of air quality that do not give rise to significant negative impacts on, and risks to human health and the environment". It thus aims to evaluate air pollution

abatement strategies for traffic-related NO_x levels, in particular NO₂, in cities. MINOX-STREET will offer local authorities guidelines for applying sustainable, cost-effective and integrated solutions for air quality management, such as optimising the use of commercial photo-catalytic materials designed for air purification, and assessing the role that these materials can play in combination with others technologies and strategies (cost/benefit analyses). To achieve this aim, the project will develop and set up a prototype (microscale CFD model, coupled to the urban atmospheric chemistry and NO_x deposition velocities) that is able to calculate the level of pollutants in urban environments.

Specific objectives of the project are to:

- Test and compare the potential usefulness of a range of commercial photo-catalytic materials to act as NO₂ (NO_x) sinks, and select the most promising solutions to be used on urban surfaces and in real conditions;
- Provide data from rigorous assays and tests on the physical-chemical properties and expected efficiency of several commercial photo-catalytic materials, both in controlled and real-life conditions;
- Obtain the parameterisations of NO₂ and NO_x deposition velocity on selected photo-catalytic surfaces;
- Use photo-catalytic materials in real urban settings and demonstrate their air-purifying capabilities;
- Assess the potential impact of the use of these products arising from the generation of sub-products (nitrates in lixiviates, deposited and re-suspended particle matter containing the photoactive catalyst TiO₂, and volatile organic compounds);
- Evaluate the air-purifying impact from use of combined photo-catalytic materials in different urban environments at district level, using the prototype;
- Estimate the cost/benefits of this and other NO₂ (NO_x) urban air abatement strategies.

Expected results: The project findings will form the basis of a guide for local authorities on the feasibility and protocols for the use of photo-catalytic materials with NO₂ (NO_x) depolluting properties in urban environments, within the framework of an integrated NO₂ (NO_x) abatement strategies evaluation. This technology has the potential to reduce NO_x concentration in cities by up to 40%.

Results

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Environmental issues addressed:

Themes

Air and Noise - Air quality monitoring

Keywords

pollution control, air quality monitoring, environmental impact of transport, monitoring, urban area, modelling

Natura 2000 sites

Not applicable

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Beneficiaries:

Coordinator	INGENIERÍA Y ECONOMIA DEL TRANSPORTE, S.A.
Type of organisation	Public enterprise
Description	INECO is the Spanish public transport engineering company, owned and managed by the Spanish Ministry of Public Works.
Partners	Ayuntamiento de Alcobendas, Spain Centro de Estudios y Experimentación de Obras Publicas, Spain Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, Spain

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Administrative data:

Project reference	LIFE12 ENV/ES/000280
Duration	01-JUL-2013 to 01-JUL -2018
Total budget	1,982,619.00 €
EU contribution	916,913.00 €
Project location	Madrid

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