How effective is photocatalytic paint in reducing ambient nitrogen oxides?

An innovative NOx abatement technology, photocatalytic street paving and paint, is claimed to significantly reduce ambient NOx concentrations. Trials carried out in Italy [1] and China [2] report up to 50% improvement in NOx concentrations. The paving contains fine particles of titanium dioxide (TiO_2). TiO_2 is a photocatalyst. In the presence of sunlight the TiO_2 causes NOx emissions which pass over the surface of the paving to be oxidised to nitrates. These are washed away during rainfall. The paving is claimed to be suitable in areas where there is high concentration of NOx emissions and availability of UV light.

Two studies, to date, have been carried out in the ambient environment in the UK to investigate the impact of NOx reducing paint. A study carried out for the City of London indicated that no discernable difference in concentration change was seen between the study site and a background site. Daylight concentration decreases compared to night-time decreases was expected to be greater, but this was not evident [3]. Another study for the City of London indicated that decreases in NOx concentration expected of photocatalysis was evident but this is masked by seasonal differences in wind speed and direction [4].

Similar inconclusive results were found in a London Borough of Camden study [5]. This study is currently being extended.

Evidence to date from detailed, real world air quality trials involving photocatalytic products is limited. Until such studies are available, local authorities should carefully scrutinize data provided by manufacturers and where further advice is required contact the Helpdesk.

[1] Project Automation (2004) Monitoring campaign at Segrate MI, Italy. Technical report on air quality parameter measurements. Id 33.520/RG/001.

[2] Test report on vehicle exhaust cleaning effects for proactive photocatalytic system Ecorivesitmento Fotofluid Cement and Activa. (2007) Shanghai Academy of Environmental Sciences.

[3] Barnett, B. (April, 2007) Statistical analysis of monitoring results from the City of London NOx reducing paint study. Kings College, London.

[4] Colvile,R.; Barmpas, P.; Ossanlis, I.; Moussiopoulos, N. (March, 2007) Assessment of the effectiveness of NOx absorbing paint a the Sir John Cass Primary School. Imperial College, London.

[5] Esposito, G. (2008) London Borough of Camden.