



Traffic pollution can be addressed in a creative, cost effective and sustainable way.

Fact Sheet

EcoPaint™

An innovative new product in the ongoing battle against air pollution.

EcoPaint is a photocatalytic coating that uses the compound Titanium Dioxide (TiO₂) to “capture” and “neutralize” gaseous pollutants. It has been developed in Europe through a multi-partner research initiative called PICADA*, and now available in Australia exclusively from Global Engineering of Italy through Stack Management Systems.

Trials in Europe and Japan have shown the effectiveness of photocatalytic coatings and other “smart” construction materials, including plaster, mortar and architectural concrete, in combating the nitrogen oxides (collectively known as the NO_x gases) volatile organic compounds (VOCs), hydrocarbons and soot released by car exhausts. In 2002, 7,000 square metres of road surface in Milan, Italy, were covered with a photocatalytic cement-like material. Residents in the area reported that it was noticeably easier to breathe, and NO_x gases at street level were found to have been reduced by up to 60%.

EcoPaint went on sale in Europe earlier this year. In Japan, photocatalytic paints are already in use for coating freeway sound barriers and similar structures and photocatalytic paving blocks are being used in residential areas to improve the air quality. An advantage of a coating product is that it can be applied to buildings and street furniture, covering a much greater surface area than cement or paving blocks, bringing greater benefits to the community.

Key Benefits of EcoPaint

- **Absorption of NO_x and other exhaust pollutants**

Motor vehicle exhaust gases are implicated in respiratory problems, smog, acid rain formation and the fouling of building facades and the like with soot and grime. With EcoPaint we now have a passive system to continuously combat these detrimental effects from the motor vehicles we all love to use. An outline of how EcoPaint “captures” and “munches” these gases is shown in the diagram over the page.

- **Self-Cleaning and graffiti resistant**

Surfaces painted with EcoPaint present a very low contact angle to water and moisture droplets that contain pollutants. This means that the surface is self-cleaning, without the need for regular washing. This also makes the surface potentially graffiti resistant. A coating layer of only 0.3 mm has a projected lifetime of 5 years, and thicker coatings last even longer.



Wall panels coated with EcoPaint – some protected with plastic covers. The hand on the left has wiped the plastic cover, while the hand on the right has wiped the EcoPaint coating. Source: Global Engineering/PICADA

- **Enhances brightness and lighting**

Being self-cleaning, surfaces painted with EcoPaint resist soot, smut and grime – the dirty vapours from vehicles that darken buildings, soil clothes and smear windowsills. Roadside sound panels painted with EcoPaint stay cleaner and brighter for longer. A trial in a Milan road tunnel is showing signs of keeping visibility and lighting in the tunnel bright and clear, thus safer and requiring less maintenance and lighting energy.



Eco-tunnel, Milan, Italy. Source: Global Engineering



Stack Management Systems Pty Ltd
ABN 30 107 586 541
PO Box 877 Newport Beach NSW 2106
Ph 612 9954 1200 • Mob 61 412 500 702
www.smsventilation.com • AUSTRALIA



How EcoPaint Works

EcoPaint consists of tiny nanoparticles of titanium dioxide (TiO_2) and calcium carbonate (CaCO_3) in a polysiloxane (potassium silicate) base. Air turbulence carries the pollutants across the surface of the paint and the polysiloxane allows the pollutants to diffuse through the surface to the embedded TiO_2 .

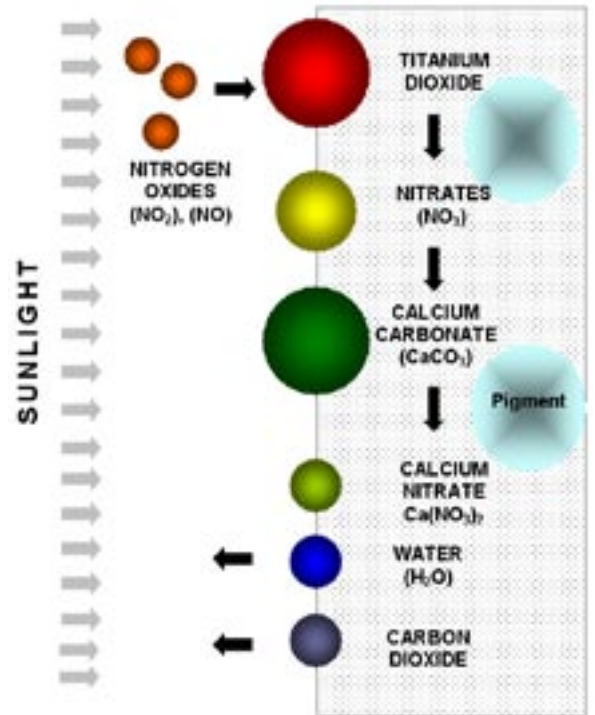
The TiO_2 particles are "photo-activated" by sunlight, using the energy from the ultra violet light to convert NO_x to nitrates (NO_3)⁻¹ which are then neutralized by the alkaline CaCO_3 , to form Calcium Nitrate ($\text{Ca}(\text{NO}_3)_2$), Carbon Dioxide (CO_2) and water (H_2O). In a similar series of reactions, Carbon monoxide and other hydrocarbons from the vehicle exhaust are oxidized to form CO_2 .

How EcoPaint Works

Reaction 1:
Titanium dioxide particles in Ecopaint absorb energy from UV light (eg. sunlight). A highly reactive form of Oxygen [O] is formed.

Reaction 2:
The oxygen attracts Nitrogen Oxides to the surface treated with Ecopaint and reacts with them to form nitrates (NO_3)⁻¹.

Reaction 3:
The nitrates react with Calcium Carbonate in the paint to form Calcium Nitrate, Carbon Dioxide (CO_2) and Water (H_2O). Thus NO_x gases are captured and "locked up" in a solid form.



Apart from its porosity, polysiloxane has been found to be resistant to attack by TiO_2 and the corrosive effects of the pollutants, unlike other bases tried previously. This means the paint remains stable and durable throughout the life of its active ingredients, and it protects the underlying material from the corrosive and deteriorating effects of the vehicle pollutants.

Technical Details

- EcoPaint is water-based, self-cleaning, water vapour permeable, biocide free, non-flammable and resistant to mould and fungal growth.
- A 0.3mm layer of EcoPaint has enough active ingredients to last five years in a heavily polluted area. There is a direct relationship between coating thickness and the service life of the coating - thicker coatings, extend re-painting time significantly and reduce maintenance costs.
- The colour of the EcoPaint being used in Italy and Japan is mainly white. However, the active particles in the paint are so tiny that the paint is transparent, and pigment can be added to create any colour of final finish that might be required.

*What is PICADA?

PICADA (Photocatalytic Innovative Coverings Applications for Depollution Assessment) is a programme developed by a European consortium of private enterprises, research institutions and the European Commission's Joint Research Centre (JRC). PICADA began on 1 January 2002 to run a test programme for innovative construction materials and coatings to help fight air pollution. The program will finish in 2005.

Various "smart" construction materials have been tested under experimental conditions of humidity, temperature and UV light at the INDOORTON facility at the JRC in Ispra, Italy.

The European Union (EU) has set a target of reducing NO_x levels to under 21 parts per billion by 2010.

For further information

SMS: www.smsventilation.com • Mobile: 61 412 500 702

Global Engineering: www.globalengineering.info

EcoPaint is now available in Australia exclusively through Stack Management Systems



EcoPaint™

