



aquazole - Demonstration of the industrial fabrication of an alternative clean fuel for urban fleet: water-diesel emulsion.

LIFE97 ENV/F/000197



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Project description:

Background

Environmental problems related to the impact of transport on the quality of air have been clearly identified and are a growing concern for policy-makers. The reduction of the emission of nitrogen oxides, smokes and particulate matters is an important issue for public health, and many governments are ready to provide tax incentives to reach the targets set by the Kyoto protocol. Research results at the laboratory and pilot scales have led to the preparation of a water-diesel emulsion, stable under storage and diesel engine operating conditions. This fuel could be used by the urban captive fleet, such as buses and city trucks, but also on the railroad and marine transportation, etc. The innovative aspect of this unique fuel is that its combustion leads to a drastic reduction in the major pollutants produced by the urban captive fleet under real driving conditions, particularly nitrogen oxides, smokes and particulate matters.

Objectives

The aims of this project included : - demonstration step of the industrial feasibility of water-diesel emulsion production, - checking all the specifications related to this new type of fuel, - performance assessment and the monitoring of pollutants measurement tests on bench engines and vehicles to validate the production process. This was carried out in close collaboration with the urban fleet of Chambéry managed by the Société des Transports de l'Agglomération de

Chambéry. TotalElfina (TEF) had already undertaken other tests with the RATP (the Public transport network in Paris).

Results

TotalElfina (TEF) has a policy of developing a range of fuels that are less harmful for the environment. By 2010, they aim to reduce emissions of CO₂ (carbon dioxide), CH₄ (methane) and NO_x (nitrogen oxides) by 15%. This project is part of that policy. Given that water and oil do not mix, TEF researchers had to develop a special additive package that includes an emulsifier to bind water and diesel efficiently. Mixing the specially developed additives package with six parts of conventional diesel fuel and one part water forms Aquazole, a milky, homogeneous, ready-for-use emulsion. This blend stays stable for more than three months, and can be shipped, stored and used in the same way as regular diesel fuel. The emulsion was found to be stable over a temperature range of -20°C to +80°C. To allow for different climatic conditions, other formulas have been developed, including an Extreme Cold Aquazole for use in temperatures below -20°C. The production process was scaled up, thanks to a pilot production unit built for large-volume test sites. The LIFE funding allowed a comparison between different production technologies, the pilot production of the emulsifier, the testing of the environmental quality of the product, the development of quality control procedures and the testing of Aquazole on the public transport fleet in Chambéry. After the test phase, the main bus producers (Renault, Volvo, Mercedes, Iveco) agreed to use Aquazole and to maintain their after-sales guarantees even when Aquazole was used. By the end of the project, 300 heavy vehicles were operating on Aquazole in the Rhone-Alpes region, and had realised a total of 2 million kilometres. In 2001, five industrial production units were operating in France alone. It has been demonstrated that Aquazole cuts nitrogen oxides (NO_x) emissions by 16 percent, and particulate matters in black smoke emissions by 60 %. A 4% cut in fuel consumption is also noticeable, and this helps to reduce CO₂ emissions. For this reason fleet operators using Aquazole may qualify for government grants and/or tax incentives in Europe and the United States to assist with air quality regulation compliance. In 2002, Aquazole was certified by the California Air Resources Board, which allows California fleet operators to receive a credit of 25 cents per gallon of Aquazole.

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Environmental issues addressed:

Themes

Industry-Production - Engines - Machinery - Vehicles
Energy - Supply

Keywords

non-polluting fuel, urban area, emission reduction, public transport, alternative technology, environmental impact of transport

Target EU Legislation

- Climate Change & Energy efficiency
- "Kyoto Protocol to the United Nations Framework Convention on Climate Change - Declaration Offici ...
- Air
- Directive 2001/81- National emissions ceilings for certain atmospheric pollutants (23.10.2001)

Natura 2000 sites

Not applicable

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Beneficiaries:

Coordinator	ELF Antar France
Type of organisation	International enterprise
Description	Elf Antar France is part of the TotalElfFina group, one of the 5 major petrol producers. This project was undertaken by the Research centre based in Solaize (France).

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Administrative data:

Project reference	LIFE97 ENV/F/000197
Duration	15-FEB-1997 to 30-SEP -1998
Total budget	1,816,773.26 €
EU contribution	417,931.99 €
Project location	Rhône-Alpes(France)

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