

Overview of the LIFE BIOSEVILLE project and activities focused on particle emission reduction from bus fleet in Seville

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OVERARCHING PROJECT

The increasing use of fossil diesel in transport generated a high external energy dependence and the emission into the atmosphere of large amounts of greenhouse gases.

MAIN OBJECTIVE: to develop an integrated and sustainable system for the recovery of used frying oils generated in the city of Seville in order to produce a new biofuel, more competitive and efficient, consisting of methyl esters and glycerin ethers.

BIOSEVILLE



Specific OBJECTIVES:

- To develop a demonstration system of management and recovery of frying oils for the production of a new biofuel
- To demonstrate the viability of the new biofuel
- To recover the used frying oil as an energy resource
- To produce methyl esters by an innovative transesterification technology
- To produce technical grade glycerin with a purity degree of at least 95% by membrane technology
- To produce glycerin esters from technical grade glycerin and acetic acid, by acid catalysis
- To produce a new biofuel based on methyl esters and glycerin esters mixtures
- To demonstrate the improvements in the combustion process of the new biofuel

ACTIVITIES OF PARTNERS

- CTAER: Project coordinator
- Campos Sur Investiga: Supply and characterisation of domestic frying oils. Design, construction and adjustment of the prototype module. Optimisation and operation of the prototype module.
- US: Design, installation and adjustment of the prototype module for the production of glycerin ester.
- CARTIF: Module operation, optimisation and production prototype glycerin esters.
- CIEMAT: Demonstration of the improvement in the combustion process of the biofuel (methyl ester + bioadditive). Emissions measures in engine bench, and Emissions measures in a urban bus



CIEMAT METHODOLOGY:

- Mixing and optimization of methyl esters and bio-additives with commercial diesel
- Measurement of emission with test bench engine (2500-15000 cc) and measuring the particles with an EEPS 3090 (number and size distribution in the 5.6- 560nm range) and a WCPC 3788 (particle number).
- Design and development of on-board measurement system for nanoparticle and gas emission from bus.
- On-board measurement on several routes in the city of Seville
- Evaluation of results: Nanoparticle number and size distribution emissions depending on route and with the bus running with the better methyl & ester bio-additive & commercial diesel blend previously selected in the engine bench
- Emissions Inventory for the urban bus fleet sector in Seville.

EXPECTED RESULTS

- Demonstration of the technical and economic viability of using the new biofuel in the local bus fleet in Seville.
- Reduced emissions in the bus fleet for each of four tested biofuel mixtures: Carbon monoxide (CO) and hydrocarbon (HC) emissions reduced by up to 30%; Particulate matter emissions reduced by up to 50%; NOx emissions reduced by up to 5%.
- Global CO₂ emissions reduced by 50-85% compared with conventional diesel, considering the full life cycle of the fuel - including the collection of the used cooking oils, processing of the oils, and consumption of the biofuel in the urban bus fleet.

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